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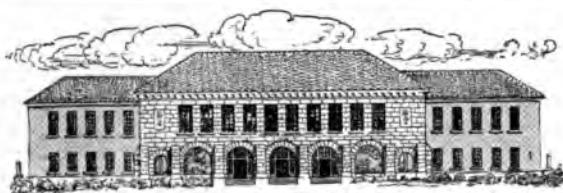
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## SOME PROBLEMS ARISING IN THE ADMINISTRATION OF A DEPARTMENT OF MEASUREMENTS

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The problems outlined below have been selected for presentation as the result of a year's experience in directing measurement work in a city of fifty thousand. To one old in the service, they will perhaps appear too simple to deserve mention. They represent, however, problems actually confronted in the work of organization, and to one inexperienced in administration, they are truly formidable. They include mainly those types of situations that are constantly arising and demanding immediate action, but which, to my knowledge, are not mentioned in any publications that discuss the use of measurements in the public schools. The purpose of this article is to describe these types of problems, and to suggest briefly a few principles and methods that may be of some service to one undertaking the organization of a department for the first time.

### THE PROBLEM OF ACQUAINTING THE TEACHERS WITH THE FUNCTIONS OF THE DEPARTMENT

Much time will be saved and many misunderstandings avoided, if a bulletin giving some general information regarding the newly created department and its aims is distributed among the teachers early in the term. This bulletin should include such information as: (a) a general statement of the aims of the department—the purpose of mental and educational tests, how they can be of service to teachers and to pupils, what kinds of information concerning a pupil they can and cannot reveal;

(b) an explanation of test terminology—the meaning of mental age, intelligence quotient, Binet, achievement scores, median, standards, norms, percentile rank, etc.; (c) some general principles of test procedure—such as cautions against interruptions during both individual and group examinations, against asking pupils point blank if they have had a “mental test” or telling them that they are about to be given an “intelligence examination,” and against announcing intelligence scores and ratings to pupils and parents. There should be included also such general principles as the imperative need of accuracy, the necessity of noting conditions that may have influenced performance in the test, and the desirability of conducting the testing as if it were an ordinary school exercise.

### PROBLEMS OF TEST ADMINISTRATION

#### I. INDIVIDUAL EXAMINING

Calls for individual examinations will be more or less continuous throughout the year. Teachers should be supplied with a standard form on which to report children for individual examination. For this purpose a card may be used which will call for such information as name of pupil, chronological age, grade level, school record, and any other data that will aid the examiner to a more complete understanding of the case. The use of a standard form of this sort simplifies the problem of filing, and enables the examiner to determine readily in which schools and in which grades the needs are most urgent, and how he can arrange his schedule so as to be most economical of time.

As a rule, individual testing should be done in the school buildings and during school hours. Only exceptional cases, and then only older children, should be brought to the office for examination. Conduct the examination in a special room, away from noise in the halls, and where possibilities of interruption are at a minimum. When calling a child from the room, avoid arousing the comments of his classmates, and assure him at once that he is being called out to do you a favor and not for any mis-

demeanor. Save for special reasons, do not permit the testing to extend through the recess period or after school hours.

## 2. GROUP EXAMINING

*a. Instructing teachers.*—When a rapid general survey of the whole system is to be made, group tests must be employed. Most of the group tests now on the market are simple enough to be administered by the teachers after they have been instructed in their use by the chief examiner. For purposes of instruction, teachers' meetings may conveniently be called by schools, provided the number in the group will not exceed twenty or thirty. Notice of the meeting, together with a statement of its purpose, should be sent out at least a week in advance. If the manual of directions for giving the test is distributed with the notices, and assignments are made covering the most essential points, the amount of time spent in explanation during the meeting will be greatly reduced.

When giving instructions to the assembled group, the following general points should be covered first: the name of the test, its author, the principles underlying its construction (its different parts and, briefly, what each is designed to test), its reliability, and the interpretation of results with special reference to the significance of medians, age standards, and grade standards.

Instructions for giving the test, as outlined in the manual, should then be taken up in detail. They should be read with the teachers, and special attention should be called to the more important points. Particular emphasis should be laid upon the importance (*a*) of uniform conditions, (*b*) of accurate timing, and, (*c*) of guarding against interruptions. In this connection have it definitely understood that all school projects are secondary to this testing program and that visitors are not welcome. Have it understood also that the testing program should not be discussed beforehand with the pupils.

When these instructions are properly understood, the tests may well be given to the teachers themselves. Before the blanks

are distributed it should be made clear that the object is to familiarize the teachers with the content of the test and to give them a better understanding of the attitude of the children when they take the test. Unless there is some reason to the contrary, announce that the administration is not interested in the scores that the teachers as individuals will make, that the papers will not be collected or the scores recorded. Give the test exactly as directed in the manual, except with respect to the time-limits, which may be advantageously shortened by a half or a third.

When the test has been given, discuss in detail the instructions for scoring. Provide each teacher with a set of stencils and have them score their own papers. Be careful to explain: (a) the use of stencils, (b) the scoring formula for each part, (c) transferring scores to the front page, (d) weighting, and (e) the prime necessity of accuracy.

If the test blanks do not provide space for a short record of the child's school history, some code system should be arranged at this meeting for indicating a few important facts on the cover of the blanks. Some convenient scheme, such as *R.* for repeater, *E.P.* for extra promotion, *C.* for conditioned, *S.S.* for speed school, etc., may be adopted. Of particular importance in this code is some symbol—such as a question mark—for indicating those pupils who tested high but whose school achievements would have led their teachers to predict that they would test low, and *vice versa*. Such cases as these are of particular importance in follow-up work.

*b. Scoring and recording results.*—Teachers should be required to score the papers of the pupils under their charge, and this for several reasons: in the first place, if their professional attitude is what it should be, they are anxious to take an active part in the investigation; furthermore, to permit them to take part affords them valuable knowledge of the extent and variety of the individual differences among their pupils; and finally, a very important saving of time is secured for the department without imposing undue hardship upon any teacher.

Experience has shown that mistakes in teachers' scoring are frequent enough and serious enough to demand re-checking of all test-blanks at the department's office. This is particularly true of intelligence tests when individual adjustments are to be made on the basis of the scores or when critical scores are to be established for classifying pupils in different groups. However, if half the papers scored by a given teacher are found to be without error, the remaining half may be assumed to be correctly scored without re-checking them.

Blanks should be returned to the office for re-checking within two weeks after the date of examination. The scores may then be transcribed in the order most convenient for filing. The blanks may afterwards be stored, or, in the case of educational tests, if the teachers are interested in basing instruction upon weaknesses as revealed in the tests, they may be returned to the schools.

Records of the scores as checked by the office should be returned to the teachers. Where numerous or wide discrepancies have been discovered in the re-scoring, the matter ought to be brought to the attention of the teachers concerned and their mistakes explained.

*c. Time-schedule of examinations.*—If the measurement program includes both intelligence and educational measurements, the intelligence testing should preferably be done first. The reasons for this are (1) all special adjustments should be made primarily on the basis of intelligence ratings, and (2) the results of educational tests are best interpreted in the light of the mental capacities of the children tested.

The time of the semester at which group testing should be done is largely dependent upon the use to be made of the results obtained. Intelligence tests should be given preferably at the beginning of the fall term. Subsequent adjustments and plans for re-classification at the beginning of the winter term can be made if these data are at hand. Then, too, a general survey of this sort made early in the year saves much individual testing.

Educational tests in the same subject matter should be given at least two or three times a year. A survey at the beginning of the fall term indicates the condition of the grades and furnishes a point of attack for determining what is to be done. The test repeated during the mid-year reveals what has been accomplished during the first term, and a repetition at the close of the spring term indicates the work accomplished and the progress achieved for the year. When deciding upon the day of the week for the test, some consideration should be given to those days on which attendance is likely to be highest; for example, in many school systems attendance tends to fall off on Monday and Friday.

All wholesale testing should be done on schedule—on the same day and at the same hour in all buildings. There is perhaps some slight advantage to be gained in giving educational tests during the subject period. Intelligence testing should be done preferably during the first period in the morning, beginning ten to fifteen minutes after school convenes to allow all stragglers to be in their seats. Scheduling tests for this period of the day eliminates those criticisms which arise from the popular belief that pupil's minds are "brighter" at the beginning of the school day.

*d. Types of classes to be included.*—When making a general survey throughout the grades, the question sometimes arises whether or not the children in the special schools should be included. Children in the open-air, deaf, blind, and ungraded rooms are in a certain sense mentally handicapped; their performances are not those of normal children. On the other hand, they form an integral part of the school system, and with the exception of pupils in the classes for the feeble-minded, they are in the main following the regular course of study. If the school system were less highly organized most of these children would be found in the regular grade rooms and their scores would be included without question in the city distributions, so that the only justification for excluding them from these distributions lies in the fact that their handicaps have been recognized and that they have been grouped accordingly. If test scores in these schools can be

used in re-classifying within the groups, or if the department is interested in the data for purposes of comparison, the tests should be given. In making distributions, however, it is advisable to have the data classified in such a way that they may or may not be included in the standard city distribution.

#### PROBLEMS OF CLASSIFICATION

Any testing program, to justify its existence, must result in a more homogeneous grouping of the children tested and eventually in a differentiation of the course of study and methods of instruction to accord with the revised grouping. This work of classification presents numerous special problems, the solution of which gives rise to certain general principles of procedure that are perhaps worth mentioning here.

(1) Utilize at the outset those administrative devices already in operation in the local system. Thus, if there exist speed classes or ungraded classes, an obvious first step is to make sure that pupils assigned to these rooms are henceforth scientifically selected.

(2) Set up definite standards for every type of adjustment. In the minds of the director and examiners at least, there should be a clear definition in scientific terms of the types of pupils eligible to special classes of various sorts or to special promotions, *e. g.*, a certain range of intelligence quotients and of mental ages should obtain for pupils selected for double work, another for pupils selected for ungraded classes, and so on. Of course, there will be instances in which the test rating must be disregarded because other factors, equally important, indicate some other disposition of the pupil; but care must be taken that these variations from the rule do not become so numerous that the homogeneity of the group is destroyed. Care must be taken, for instance, to guard against the tendency of some principals to transfer 'misfits' to the special room geographically most convenient, without proper consideration of the real needs of the pupils or the purpose of the class in question. Similarly, unless caution is exercised in

keeping the groups separate, there is a tendency for speech defectives, sight and hearing defectives, feeble-minded, and anaemic to be grouped together in one room. In case a child is eligible to two or more special classes, he should be assigned first to that class in which some of his defects may be lessened, if not cured. Thus an anaemic, feeble-minded child should be sent first to the open-air class and later transferred to the ungraded<sup>1</sup>; or a feeble-minded child with a curable speech defect, should have that defect alleviated and then be sent to the ungraded room.

(3) Give due consideration to scholarship records and teachers' opinions when making individual adjustments. This rule should hold in all cases, whether the test and the teachers agree or not. Frequently teachers can furnish data regarding home conditions, health, social characteristics, such as industry, ambition, etc., which may be decisive in determining where a child should be placed. In cases of wide discrepancy, where the evidence is such that one is still warranted in proceeding in the direction indicated by the test score, a frank presentation of the reasons for acting at variance with the teacher's judgment will do much to keep the teachers in sympathy with the administration.

(4) Re-examine all doubtful cases. In instances of wide disagreement between teachers' estimates and test scores, another examination should be given before classification is attempted. If there are enough cases of this kind, they may be re-examined as a group by another form of the same group test, or if especially accurate ratings are desired, they should be given an individual examination.

(5) All adjustments that bid fair to affect the child's educational career for more than a year should be made only after an individual examination, ordinarily the Binet. Children assigned to a class for the feeble-minded usually spend the rest of their school lives there. It follows that, before a child is committed to a room of this type, it is essential that all precautions be taken to have complete and reliable information concerning the case.

<sup>1</sup>The term "ungraded" throughout this paper has reference to those classes designed for the definitely feeble minded.

(6) The director should make adjustments, having in mind not only the system of school organization obtaining at the moment, but also having in mind the possibility of future modifications of the system. Thus, classification might proceed in the direction of a plan of organization that provided courses of study and methods of instruction adapted to five levels of mental efficiency: (a) children definitely feeble-minded but not institutional cases, (b) dull and backward children, (c) normal children, (d) superior children, (e) very superior children.

(7) The first step toward such a classification as that just mentioned might be taken by making provision for the two extreme groups, *i. e.*, for the feeble-minded and for the gifted. This leads to the consideration of certain special principles that should operate in the selection of these groups.

(a) A preliminary selection of candidates for the classes for the feeble-minded may be made on the basis of percentile rank in a group intelligence test. However, all cases of this sort should be re-examined with the Binet scale before pupils are finally transferred. Re-examination by another form or kind of group examination is not advisable, because very frequently children who score extremely low on a group test, when given the Binet, prove to be children who are not mentally defective (many of them actually testing normal) but who are lacking in ability to read. For this reason, they should be given an examination in which ability to score high is not dependent upon school skill.

(b) When assigning children to ungraded groups, care should be exercised that the child is not being put in a group distinctly inferior to him, and one in which the type of work is wholly unsuited to his needs and capacities. Thus, a child with an I. Q. of 75 is as much out of place among children with I. Q.'s of 50 as he is among normal children.

(c) Children at the upper end of the scale of intelligence are often capable of doing twice as much work in the same amount of time as children who cluster around the average. Children assigned to special classes for the gifted should be selected on the basis of both mental age and I. Q. That is, the child should

meet the mental age requirement for the grade he is about to enter, as well as the I. Q. standard for a gifted child. Thus to take an extreme case, a pupil in the fifth grade, although he might have an I. Q. of 130, could not be expected to do average work for the grade if his mental age were only nine years and six months. No matter how high a child's I. Q. may be, he cannot be expected to do successful work unless he is *mentally* at age for his grade. If assignments are made according to group intelligence ratings, children should be selected according to age-percentile rank, *e. g.*, pupils selected for the third grade should be in the 90th percentile or above in the 8-year group, and pupils selected for the fourth grade should be in the 90th percentile or above in the 9-year group, etc.

(d) In the selection of pupils for gifted classes, teachers' judgments should be given considerable weight. Unless a child is exceptionally gifted, he will find work of this sort difficult if he has not had the necessary educational background. However, teachers' estimates should not always take precedence over test ratings, particularly if the test rating is exceptionally high. In cases of this sort it is advisable to secure from the elementary supervisor some statement as to the achievement standards of the teacher in question, the quality of her teaching, and on what she places emphasis in the classroom. If she is a teacher who stresses drill, or who maintains very high standards of achievement, the child may usually be sent without further delay or re-examination.

If the opposite situation occurs, where the teacher is certain the child is capable of being accelerated, and his test standing is low, he should be re-examined. Occasionally a child does not do himself justice in a group examination. Generally, however, cases of this sort prove to be instances in which the first test rating is accurate, but in which the child is a year or two older than his classmates so that his maturity has influenced the teacher in placing her estimate too high. Examples of this sort serve to show the importance of considering I. Q.'s and percentile ranks in the selection of children for this type of work.

Teachers sometimes object to giving special promotion to a child whose test rating indicates that he is capable of more advanced work, on the ground that his writing or spelling is poor. These objections should have little weight. If the child reads well and is doing average or better work (though not necessarily exceptional) in the regular promotional subjects, one is justified in allowing him to try the advanced work.

(e) If transfer to gifted classes is not compulsory and the pupils must come from several different sections to some central school, one-third to one-half more children should be considered as candidates than the rooms will accommodate. Parents' objections, time of year, distance, fear of "crowding"—all tend to reduce to a considerable degree the number originally selected. Some of these pupils whose transfer is thus opposed may be taken care of by means of special promotions.

(8) The removal of the definitely sub-normal usually accentuates the problem of the border-line group. There is to be found in all the elementary grades, a considerable number of over-age children who are too advanced to be put in an ungraded room (particularly among younger children) and yet too lacking in intelligence to keep the pace of the regular grade. These "slow-dull" children are capable of academic progress, but at a slower pace and under modified tutelage. We have found in our own system that the segregation of these children (one type ranging in chronological age from  $6\frac{1}{2}$  to 12 years, and the other from 12 to 16, and both ranging in I. Q. roughly from 70-85) has been of distinct pedagogical value, both to the children segregated and to the groups from which they were taken.

(9) The examination of most school systems reveals a small group of retarded children whose retardation has come not on account of mental deficiency, but on account of transfers, prolonged absences, or some other accidental factor. Provision for children of this type can be made by organizing classes in the junior high school building to which they may be transferred upon completion of at least the fourth grade. Here they can be given academic work of fifth- and sixth-grade difficulty, and at the same

time secure the advantages of associating with pupils of their own age, and of including in their school program some subjects of a more practical nature, such as shop work, household economics, printing, manual arts, etc.

(10) After provision has been made for these various special groups, some consideration should be given to the classification of those who remain in the regular grade rooms. The most obvious plan is a three-fold division of these pupils into groups that are slow, average, and good. A scheme of this sort must generally be worked out gradually. It may be put into operation first in those rooms that have whole grades; and later, as conditions permit, it may be extended through the system. The adoption of such a plan involves the problems of revising the course of study and of providing for the continuance of each of these groups as a separate unit through the grades.

(11) The program of classification thus far outlined concerns children who have already made some progress through the grades. Ideally, however, it is obvious that classification should begin at the outset, that is in the first grade. Although several group intelligence examinations have been devised for use in the first grade, we feel that in the case of incoming first-grade pupils greater reliability is secured by individual examination. A plan of this sort is not impossible if kindergarten teachers are drafted into the service. A course in the administration of the Binet examination may be conducted for kindergarten teachers with very satisfactory results if the teachers once understand how important the matter of classification is, and of what advantage it is to them to have a means of determining accurately the capacities of the children in their charge. When kindergarten teachers are trained in the use of the scale, children may be tested at leisure during the year, and the small percentage of children who enter the first grade without kindergarten training may be tested by the department at the opening of each semester.

The first year a plan of this sort is put into operation, it may be advisable to set the standard for admission somewhat lower than that which is to be adopted ultimately. There are several

reasons for this: if changes are to be made later, it is easier to raise the requirements than to lower them; there will be many puzzled parents to whom the conditions of admission must be explained and the fewer the children excluded the fewer the parental objections; care must be taken that in certain sections of the city an added burden is not put upon the kindergarten teachers because of the number retained, and in the better sections of the city, that the first grades are not overcrowded. It should be explained to first-grade teachers, that, while the children assigned to them under this system are presumably capable of standard first-grade work, there are other factors besides intelligence which have bearing upon a child's success in school. Most important of these are attendance and attention. This warning is necessary, particularly when the plan of admission is new, to guard against the attitude sometimes assumed by teachers that if a child has the capacity for learning, that in itself is sufficient to assure his success.

The many levels of capacity and the wide range of individual difference revealed by the examination of the children about to enter the school system furnish much valuable evidence for convincing the school officials that there is a real need for widening and differentiating the course of study, for establishing new types of classes, and for increasing the instructional units to approximate more closely the different levels of capacity.

#### THE PROBLEM OF MEETING PARENTS' OBJECTIONS

Whenever re-classification is undertaken on a large scale, or whenever children of like abilities are sent to a central school at some distance from their district, considerable time must be devoted to meeting parents' objections. In so far as possible, dealings with the parents should be delegated to the teachers of the particular pupils concerned. Teachers are generally better able to cope with the situation because of their personal contact with the pupil's daily life and their familiarity with his home conditions; and for this reason, many parents are more willing to comply when the decision appears to have been made by the teacher,

than they are if they feel that their children are being handled by an impersonal system operated in some central administrative office. For the sake of uniformity and to avoid misunderstandings, a brief outline of the plan of classification to be followed, and its purpose, together with arguments for meeting objections to it, should be put in the hands of every teacher who is likely to be called upon to defend the administration and its policies. Teachers should understand, however, that in offering explanations or defense of the system they should not announce the intelligence scores of individual pupils. If these explanations by the teachers fail to satisfy the parents or if they are persistent in their request for the test ratings of their children, they should then be referred to the office of the department.

When explaining to parents the reasons for transfers, particularly for transfers to the ungraded room, blunt reference to "mental deficiency" or "feeble-mindedness" should be avoided. Stress may be laid to better advantage upon such arguments as that the child is not up to grade and is in need of special help; that some children are "young for their years" and should have considerable individual instruction; that special classes are organized for the specific purpose of giving such children this benefit of individual instruction and a larger share of a teacher's time; that the child will be receiving instruction that costs much more than that given in the larger classes of the regular grades; that every opportunity is afforded for the child to progress at his own rate, with more time devoted to the subjects which he finds more difficult and with proportionately shorter periods to the subjects in which he is doing satisfactory work; that the opportunities provided by the special class save the child from the humiliation of non-promotion and the formation of the undesirable habit of failure.

#### THE PROBLEM OF PUBLICITY

The department should give publicity to the work it is undertaking whenever a reasonable opportunity presents itself. Short

news items should appear frequently in the column of school news, and reporters are always glad to receive longer items or special stories for Sunday editions. However, experience has shown that to avoid serious misunderstandings, any material submitted for publication should be prepared by the department (and if at all important, endorsed by the superintendent) and given to the reporter with the understanding that it appear *verbatim*. If for any reason the original draft does not meet with the reporter's approval, his revision should be submitted to the department before it appears in print. A carelessly phrased sentence or a slight exaggeration of facts appearing in a local newspaper can easily cost the department much time and energy in refuting false charges and re-establishing confidence. For advertising within the system, an occasional few minutes in a teachers' meeting may be used to advantage in sketching briefly the results accomplished for the schools by measurement methods.

Parent-teachers' meetings serve as an excellent channel for presenting to parents in an untechnical way what the new methods of classification are, and what they mean for the children.

Business organizations and womens' clubs are often glad to have special speakers appear on their programs, and when invitations of this sort are extended, they should be accepted, in so far as time permits.

It is obvious that the content of material for publicity of the sort just mentioned should be very general in character. Critical scores, borderline cases, mental deficiency, etc., should be mentioned only in general terms. References should never be personal, and names of pupils are taboo. If any definite statements are to be made pertaining to policies and classification, it is well to keep in mind that they will be quoted many times over, and that the department may be called upon to defend them as often as they are quoted.

A few points that may be stressed to advantage on occasions of this sort are: how the school must meet the problem of individual differences; the reliability of test methods for determining individual differences; the advantages to be gained from uni-

form, objective standards of grading; the emphasis that test methods place upon the individual pupil; the wisdom of setting up different standards of achievement for different levels of ability; the opportunities afforded the pupils by differentiation of curricula; testimonials of teachers, pupils, and parents concerning the value of the work.

When the work of the department is to be discussed before a conference at which representatives from other school systems are to be present, it is good policy to submit, not only to the superintendent, but to the elementary supervisor or any other department that may in any way be concerned, a general outline of the topics to be presented. This is particularly true when the department is new and the director is not entirely familiar with the whole school situation. Occasionally, there exist undesirable situations, which though recognized within the system, may be more successfully handled if the knowledge of them is not extended beyond the limits of the school.

#### THE PROBLEM OF CO-OPERATION WITH OTHER OFFICERS OR ADMINISTRATION

It is peculiarly necessary in the case of the department of measurements that close co-operation and mutual understanding exist between it and other administrative departments. That the superintendent should be kept in close touch with all the work of the department is, of course, obvious. Some suggestions for maintaining this contact are presented in a later section.

No measurement and classification program can be put into effect successfully without a clear understanding of the grade standards that prevail in the local system. This means that the director of the department must be thoroughly conversant with the course of study and must confer frequently with the grade supervisor concerning details. The supervisor frequently renders valuable service also in advising with respect to teachers' abilities and standards. When teachers' estimates and pupils' achievements do not accord with test ratings, the supervisor can often point out the cause of the discrepancy. Weak teaching,

too much emphasis on drill and mechanics, over-valuation of memory, social standing, and the like, are often revealed as exerting considerable influence on teachers' estimates. It is the elementary supervisor through whom, more than any other agent, the Department of Measurements must hope to translate the results of its educational testing program into vital modifications of classroom procedure,—the real justification of any program of testing.

There are certain phases of re-classification which necessitate close co-operation with the hygiene department. Before children are assigned to special schools (particularly the gifted or the feeble-minded) fairly complete medical examinations should be given. Pathological cases should be referred to the school physician, as well as those cases in which impaired vision or hearing, speech defects, or malnutrition rather than lack of intelligence, have interfered with a child's progress through the grades.

Much valuable assistance can be obtained through the psychopathic or psychological clinics conducted by the city hospitals. It is also advisable early in the year to establish relations with the state institutions for the insane, the feeble-minded, and the incorrigible, and to become familiar with the procedure for having children committed to them. In this connection, too, it is well to have a working knowledge of the court procedure applicable to these cases.

The Attendance Department may often be of assistance in furnishing valuable supplementary data in certain kinds of cases. Teachers are sometimes disposed to bring cases of truancy, incorrigibility, and indifference to the attention of the Measurement Department with the idea that the child's intelligence is at fault. A report on home conditions from the attendance officer will often indicate the real cause of the difficulty and suggest the best way to meet it.

#### PROBLEMS OF INTERNAL ADMINISTRATION

##### I. FOLLOW-UP WORK

The department should include in its program some provision for following up the results of its work. It ought to be in a posi-

tion to report such things as the reduction in the number of failures among children selected by test methods, the progress of pupils given extra promotion or assigned to double work, the opinion of teachers regarding the success of its methods, the progress made in individual cases where special remedial measures have been adopted, and the changes in achievement and attitude of those pupils for whom special provision has been made.

## 2. REPORTS

Whether the superintendent requests it or not, a departmental report should be made at the close of each month. The report should include such information as: the kind and number of examinations given, and the kind and number of adjustments made on the basis of the test scores. Mention should be made of the administrative devices lacking to make re-classification complete, the number and kinds of special cases not provided for, suggestions for possible changes in the administrative organization that would meet these needs, and an outline of new projects recently undertaken or being contemplated. A report of this kind is of value because it keeps the work of the department constantly before the administration, and it affords an easy means of compiling data for the annual report. Separate reports should be rendered of each special piece of investigation.

## 3. FILING

Complete records, available for ready reference, of all examinations given should be in the files of the department office.

*a. Case record cards.*—A card file should be kept for every child examined, either individually or by group tests, and data should be transcribed to these cards as soon as received. The kind and amount of information that should appear on this record card depends somewhat upon the method of filing in vogue in the school system. There are, however, certain items which should appear, even if it means duplication of other records, as for example: name of pupil; name of parent; date of birth;

family history; grade record, including scholarship record and grades skipped and repeated; and records (including date of examination, score, percentile rank, and standard) for all individual and group intelligence examinations and all educational measurements; remedial measures adopted, adjustments, and progress. These cards may be filed alphabetically, or in the case of special schools, by rooms or classes.

*b. Record booklets.*—There should be a separate file, kept alphabetically by pupils' names, of all the Binet examinations given. Occasions frequently arise when one is interested in knowing a child's performance in certain parts of the test, and for this the test blank must be consulted. Until the file becomes too cumbersome, the record booklets themselves may be kept in the drawers.

The record booklets for group examinations are seldom referred to, except for secondary, experimental purposes, and these, after the ratings have been transcribed, may be destroyed at the end of each term.

*c. School file.*—It is sometimes convenient to have data filed separately by schools. Under these school files may be included distribution tables, graphs, and any other statistical data compiled by schools.

In addition to the group examination data, under each school a brief record should be kept of the individual examinations given. A sheet on which the name, chronological age, mental age, date of examination, and remarks may be given briefly is sufficient for this purpose. A record of this kind saves much time when checking for monthly reports. It serves, too, as an indication of the relative amount of time being given to each school. Separate records should be kept for special schools, such as speed, opportunity, ungraded, open-air, deaf, etc.

*d. Miscellaneous record and forms.*—An up-to-date file of educational and mental tests, with a separate folder for publisher's announcements, is frequently of use.

A calendar file of each day's work, including a memorandum of examinations given, schools visited, or adjustments made, is of service in compiling monthly and annual reports.

Early in the year standard forms should be adopted for keeping records and for reporting scores. Whenever individual examinations are given in a building, a record of the children tested, together with their standings, should be sent to the teacher or principal within a few days after the examination.

#### 4. COST ACCOUNTING

The department should keep an itemized record of its expenditures, including such items as cost of test equipment, blanks, and clerical assistance. A record of this sort is of value in approximating the cost of new projects, or in determining the relative costs of individual and group examinations, and the cost per capita (in time and money) of different tests.

#### CONCLUSION

As stated in the introductory paragraph, the problems presented in this article are those that actually confronted the writer in the course of one year's experience as a director of measurement work. It is realized that the solutions reached may not have general validity, because they are based on experience in one department in one city and because the conditions that surround the work of a Department of Measurements must vary decidedly in different schools. Nevertheless, the problems that confront the director of such a department are not likely to vary much in kind, and it is for this reason, coupled with the fact that little discussion of them appears in texts on measurement or on school administration, that they have been assembled for presentation in their present form.

## A DIAGNOSTIC AND REMEDIAL ACTIVITY IN SUPERVISION

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### RAISING THE LEVEL OF TEACHING THROUGH TESTS

The primary purpose of supervision is the improving of instruction so that teachers may more intelligently develop the abilities of their pupils. This aim is wide and is fulfilled to the extent that the supervisory activities lead teachers to recognize the necessity for progress, to apprehend their individual needs, and confidently to try new methods which may ensure results of a measurably higher standard.

One of the most economical ways of exercising this sort of leadership is to use standardized tests. This is true because these tests easily enable teachers to compare the standings of their pupils with those of pupils in corresponding grades of other schools, or with standard norms, and to show such comparisons objectively. Facts of this kind, however, avail little unless they are interpreted, for it is only their meanings that are helpful. The process of interpretation necessitates an analysis of results, and this in turn obviously involves an examination of the modes of instruction employed. Such a procedure implies the actual study of class-room methods with reference to specific teaching problems—a study which in most cases requires expert supervision.

Especially is this true in connection with standardized tests, for as yet there are few reports of diagnosed results linked with particular remedial methods, which a teacher can apply to the individual needs of her pupils. Therefore, while a teacher's testing of her pupils' achievement for the purpose of improving her methods of instruction is praiseworthy, it becomes of greater value both to herself and to others when the initial attempt eventuates in a constructive record such as the following.

## USING THE WOODY TESTS TO IMPROVE INSTRUCTION

*Aim.*—To prove that a grade teacher can raise the level of instruction in arithmetic and improve the results through the use of standardized tests, if she will: first, locate the difficulties of the class; second, analyze the errors; third, select the pupils who need individual help; and fourth, apply remedial measures.

1. *Locating difficulties.*—On March 1, 1921, the Woody Scale A in Division was given to a sixth grade. Twenty minutes were allowed for the test. When the papers had been carefully marked it was found from the distribution of scores that the A section had established a median of thirty-one, that the B section had reached only twenty-two, and that the entire grade had attained a median of twenty-six. The obviously better record of the A section may be partially accounted for by the fact that the pupils in that section, being a half-year in advance of the others, had had three weeks of drill on the mechanics of arithmetic similar in character to that of the test, while to the B section the work was entirely new.

The number of problems missed by each child on these papers of March first was recorded. This enabled the teacher to ascertain the individual variations revealed by the scores. For illustration, one child missed twenty out of the thirty-six problems, another nineteen, two missed eighteen, while several missed but three or four. Thus it was evident that some of the children needed individual teaching and drill.

2. *Analysing the errors.*—By going through the papers again, the troublesome types of problems were located. Short division problems were missed by few. In the division of fractions, however, the divisor was seldom inverted, and ordinary problems in long division were missed by more than two-thirds of the class. In these problems in long division the errors were due to faulty subtraction in places where the figure in the minuend was smaller than the corresponding figure in the subtrahend, and to faulty multiplication, particularly of such combinations as  $6 \times 9$ ,  $7 \times 8$ ,  $7 \times 9$ ,  $8 \times 7$ ,  $6 \times 8$ , and  $6 \times 7$ .

Since many of the errors in long division were really errors in subtraction, the Woody Scale A in Subtraction was given on April 27. The scores on these papers showed a median of thirty in both sections. The pupil with the lowest score worked twenty-one out of the thirty-five examples correctly, another worked twenty-three, and two worked twenty-five. The relatively high median evidenced the fact that the class as a whole did not need further instruction, despite the fact that individual pupils needed drill on certain types of subtraction. As in the test in long division, frequent mistakes were discovered in those problems in which the figure in the subtrahend was larger than the corresponding figure in the minuend. In the subtraction of fractions, the finding of a common denominator seemed difficult.

To determine the character of the errors in multiplication the Woody Scale A in Multiplication was given on May 20th. On this test, the B section attained a median of twenty-one and five-tenths while the A section attained a median of twenty-five, the median for the entire grade being twenty-four.

3. *Selecting pupils for individual help.*—The pupil with the lowest record on the multiplication test worked but thirteen of the thirty-nine examples correctly, and there were many scores nearly as poor as this. The pupil with the highest record worked thirty-three of the thirty-nine examples correctly. These scores were shown in graphical form in such a way as to point out the pupils who needed individual instruction and drill.

4. *Applying remedial measures.*—Now that the trouble was located, vigorous remedial work was undertaken. The essential points of this work were those common to all drills. First, the children were conscious of a difficulty to be overcome; second, they were shown the best way to overcome that difficulty; third, there was sufficient repetition to fix the correct idea, and last, the children were conscious of the fulfillment of their aim. An exemplification of these principles is found in the following presentation.

## AN ILLUSTRATIVE LESSON

Lesson Type . . . . . Drill  
 Lesson Topic . . . . . Multiplication of whole numbers  
 Teacher's Aim . . . . . To fix the correct placing of partial products when the multiplier contains zeros.  
 Subject Matter . . . . . Examples similar to:  $321 \times 102$ ,  $245 \times 202$ ,  
 $716 \times 105$ .  
 Child's Aim . . . . . To learn where to place the partial products when the multiplier contains zeros.  
 Child's Motive . . . . . To see which group can make the higher record for the graph.

1. *Presentation of the idea of the drill lesson.*—After the children are conscious of a motive for the lesson, it is essential that they should be made aware of the work they are to undertake and the best way of doing this particular work.

$(1) \begin{array}{r} 427 \\ \times 804 \\ \hline \end{array}$	$(2) \begin{array}{r} 324828 \\ \times 403 \\ \hline \end{array}$	$(3) \begin{array}{r} 425919 \\ \times 10403 \\ \hline \end{array}$
$1708$	$\text{xxxxxx}$	$\text{xxxxxx}$
$3416$	$\text{xxxxxx}$	$\text{xxxxxx}$
$\hline$	$\hline$	$\hline$

The teacher by questions may lead the class to recall those facts which relate to the particular points of the lesson and which it is necessary that the children should know in order to overcome those difficulties of which they are conscious. In this particular instance, it is the correct placing of the partial products. As the teacher leads the children to recall these facts, she may help them to fix the correct ideas by placing the correct forms on the blackboard as in the above work, sometimes by using colored chalk to emphasize the particular facts upon which she is about to drill.

2. *Repetition of the idea.*—When the pupils comprehend what they are to do and see the correct form, they are ready for the repetition of the correct form; that is, for drill.

$(1) \begin{array}{r} 321 \\ \times 102 \\ \hline \end{array}$	$(2) \begin{array}{r} 245 \\ \times 202 \\ \hline \end{array}$	$(3) \begin{array}{r} 413 \\ \times 103 \\ \hline \end{array}$	$(4) \begin{array}{r} 621 \\ \times 104 \\ \hline \end{array}$
$102$	$202$	$103$	$104$
$\hline$	$\hline$	$\hline$	$\hline$

First, a volunteer may work example (1) on the blackboard and the rest of the class may observe.

Second, the teacher may select a pupil of average ability to work number (2) on the blackboard while the class observe and criticize.

Third, the teacher may call for a volunteer from the group which has failed on this particular type of problem. This pupil may work ex-

ample (3) on the blackboard while the class may observe and offer needed suggestions.

Fourth, the teacher may select one of the weakest pupils to work example (4) on the blackboard under the personal direction of a stronger pupil while the others observe and verify the work.

Fifth, the teacher may divide the class into groups of two, one stronger and one weaker pupil in each group. The class may go to the blackboard where, for approximately ten minutes, each group may work examples similar to those presented in step one.

3. *Fulfillment of aim.*—Under a time limit (possibly five minutes), each pupil may work on paper ten examples similar to those presented above. Under the teacher's direction the pupils may then correct their work, find the averages for two groups (one composed of boys, the other of girls), and graph the results for each group.

In the particular work described a graph in color was kept on the blackboard on which were recorded separately the boys' score and the girls' score from March first to June ninth.

#### IMPROVEMENT IN RESULTS

On June 9 a second test, carefully modeled on the Woody scale in Multiplication, was given. Between the test of May 20 and that of June 9, thirteen drill lessons were given. While there still remained opportunity for improvement, a steady increase in power was evident from the results, as is shown in Figure 1.

The median of the B section had advanced from twenty-one and five-tenths to twenty-nine and five-tenths; that of the A section from twenty-five to thirty-two and five-tenths; and the entire grade from twenty-four to thirty.

The pupil with the lowest record, who worked thirteen in the first test, now worked nineteen problems, and ten children made better scores in the second test than did the one who made the highest score of the first test. Every child in the class who had been present for the drill lessons made a higher score in the second test than in the first. The greatest improvement was shown by two girls, of whom one had twenty-three wrong in the first test and eight in the second; while the other had eighteen wrong in the first and four in the second.

This procedure is worth while, for it leads a teacher to discover the necessity for individual instruction, the specific need

of each pupil, and the methods which will help children to overcome particular errors. It also makes the advancement of pupils evident and prevents waste of time in reteaching points already mastered. Not only does it make the teacher more intelligent, progressive, and valuable, but it gives the pupil a means of seeing himself as others see him and thus serves as an incentive to effort.

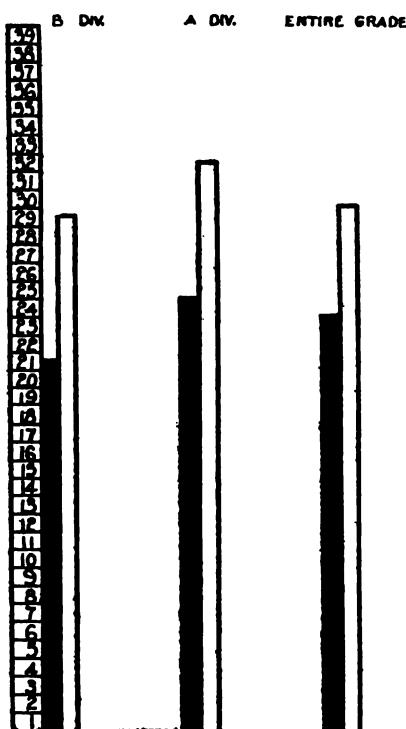


FIGURE 1. IMPROVEMENT BETWEEN JUNE 9 AND MAY 20

## PRINCIPLES OF METHOD APPLIED IN CONCRETE SITUATIONS

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Contact with many teachers having a wide variety of training and experience has convinced the writer that a common weakness is inability to apply educational principles to daily situations.

Perhaps no neglect is so far reaching in its disastrous effect as the general failure to establish correct habits of study. Believing that this inability is due to lack of insight rather than to indifference, the writer has attempted in this discussion to illustrate, by application to concrete situations, arising in a series of fourth-grade geography lessons, various educational principles and methods.

An outline of general and specific aims is followed by a discussion of these aims and some general principles involved in the two lessons which are repeated in full. Pages 31-40 give the stenographic reports of these lessons, paralleled by detailed discussion of points illustrated.

The pages and lines have been numbered so that the exact principle can be quoted and the correct reference cited for particular cases of procedure.

Having followed this plan for two lessons, we thought it would be best to give a description of the subsequent lessons with the discussion of the psychological laws and of the educational principles involved.

### DISCUSSION OF AIMS<sup>1</sup>

#### General Aims:

1. To awaken keener appreciation of life interest—clothing.
  - a. To teach man's dependence upon environment.
2. To guide in the acquisition of certain informational facts in the geography of Southern States.

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<sup>1</sup>NOTE: In the following discussion exact references are given to educational authorities whose statements corroborate those of the writer.

**Specific Aims:**

1. To arouse and stimulate interest in problem solving.
2. To guide in the acquisition of proper habits of study.
  - a. Choice of problem.
  - b. Formation of outline for study.
  - c. Responsibility of individual.
  - d. How to use text.
  - e. Value of outside references.
  - f. Increasing vocabulary.

Before the teacher can hope to guide her pupils in the acquisition of proper habits of study, she should follow psychological laws in her own procedure.

It is very necessary that the teacher be conscious of her general aims, and also of the more specific aims of each day's lessons.<sup>3</sup> She should keep constantly in mind the best interests of the "growing" child, and choose subject matter and method accordingly.<sup>4</sup>

In order that the child may take his rightful place in the social group, he should early begin to appreciate the various life interests (e. g., clothing) and man's dependence upon environment.<sup>4</sup>

That he may be intelligent concerning these phases of life, and acquire knowledge which is necessary for future growth, he should be guided in the acquisition of certain facts in the geography of the Southern States.<sup>5</sup>

By keeping in mind the *general* aims, the teacher keeps her horizon broadened, and is enabled to lead the child into a fuller appreciation and assimilation of his social inheritance. The *specific* aims tend to hold the method of procedure in definite paths. They also serve as more immediate goals by which daily progress can, to some extent, be measured.<sup>6</sup>

<sup>3</sup> McMurry, *How to Study*, pp. 31, 36.

<sup>4</sup> Dewey, *Democracy and Education*, p. 49; Thorndike, *Briefer Course*, pp. 219-222.

<sup>5</sup> Dewey, *Democracy and Education*, p. 9; Dewey, *Moral Principles in Education*, p. 34; Charters, *Teaching the Common Branches*, p. 216.

<sup>6</sup> Miller, *Psychology of Thinking*, p. 128; Charters, *Teaching the Common Branches*, p. 221.

<sup>6</sup> Dewey, *Democracy and Education*, p. 129.

Modern educators are agreed that a problematic situation furnishes the best stimulus to reflective thinking. Since it is the function of the school to equip the child for successful living now, as well as for the future, it is right that he should early become interested in this method of meeting new situations,<sup>7</sup> and that he should be assisted in acquiring proper habits of study.<sup>8</sup>

There are many phases of study which might be taught to advantage, but the following have been chosen as most necessary in this particular series of lessons. Pupils should be guided in the choice of problems.<sup>9</sup>

Even with very young pupils, if the subject is presented in a way that appeals to interest,<sup>10</sup> it is possible to have the pupils recognize and state the problem. This is of great importance, because the pupils then feel that it is *their* problem and consequently have more interest in the solution.

That the pupil may learn to organize his thoughts, it is important that he be taught the value of forming an outline for study. This outline may serve as a guide in the collection of data; also as a standard whereby the data may be evaluated.<sup>11</sup>

It is important that each pupil acquire a feeling of responsibility, if the school is to be a social institution, and if the pupil is to be a recognized member of the social group.<sup>12</sup>

Since, in the fourth grade, children begin a more extensive use of text-books, it is very necessary that they here acquire proper habits in the use of texts; and also that they begin to learn the value of outside references as a supplement of thought.<sup>13</sup>

<sup>7</sup> Thorndike, *Principles of Teaching*, p. 156; Parker, *Methods of Teaching in High Schools*, p. 170; Charters, *Teaching the Common Branches*, pp. 332, 337.

<sup>8</sup> Dewey, *Democracy and Education*, p. 57.

<sup>9</sup> Thorndike, *Briefer Course*, pp. 157, 158; Parker, *Methods of Teaching in High Schools*, p. 185; Charters, *Teaching the Common Branches*, p. 332.

<sup>10</sup> Dewey, *Interest and Effort*, p. 23.

<sup>11</sup> Thorndike, *Principles of Teaching*, p. 156; McMurry, *How to Study*, p. 94.

<sup>12</sup> Dewey, *Democracy and Education*, p. 141; McMurry, *Elementary School Standards*, p. 11; Strayer, *A Brief Course in the Teaching Process*, p. 137.

<sup>13</sup> Strayer, *Brief Course in the Teaching Process*, pp. 88-89; McMurry, *How to Study*, pp. 72-74.

Communication forms such an important element in all educative processes,<sup>14</sup> that it is highly desirable that pupils early learn the importance of an extensive vocabulary.<sup>15</sup> This may best be acquired in connection with regular work, that the interest may be direct.

### SOME GENERAL PRINCIPLES

Before beginning a detailed discussion of the lessons, may I call attention to a few general principles which have been observed throughout the entire series? In such a series of lessons there are numerous cases of reflective thinking before the final solution is reached; and yet all of these minor problems are but a part of the entire process of reflective thinking necessary to the larger solution.<sup>16</sup>

It may seem to the reader that the lessons represent a great amount of teacher activity rather than of pupil activity. It should be noted, however, that every question was followed by a pause, before any child was called on for an answer. This gave every pupil an opportunity to do independent thinking. Frequently the majority of the class were *ready* to answer when the particular child responded. It should also be kept in mind that these fourth-grade children had had very little experience in problem solving; and that it was necessary to aid them by skillful questioning to realize the problematic situation, and to find the means of solution.<sup>17</sup>

The reader will also please note that provision was made to meet every aim as outlined in the beginning. In order to do this it was necessary to keep the child's mental set, disposition, or purpose constantly favorable by having intermediary aims.<sup>18</sup>

Such a report as this can scarcely show the general schoolroom atmosphere; but great attention was paid to the physical

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<sup>14</sup> Dewey, *Democracy and Education*, p. 5.

<sup>15</sup> Parker, *Methods of Teaching in High Schools*, p. 302

<sup>16</sup> McMurry, *How to Study*, p. 36.

<sup>17</sup> Strayer, *Brief Course in the Teaching Process*, p. 114, 116.

<sup>18</sup> Thorndike, *Briefer Course*, p. 146.

welfare of the pupils,<sup>19</sup> and to securing and holding attention by avoiding distracting conditions.<sup>20</sup> Care was taken throughout that the attitude, disposition, or mental set should be conducive to good work;<sup>21</sup> that congruity of emotional tone should be maintained;<sup>22</sup> and that an inspiring and sympathetic atmosphere should exist in the school.<sup>23</sup>

## GEOGRAPHY—GRADE IV

### LESSON I

STENOGRAPHIC REPORT		DISCUSSION
Teacher:	Of what kind of material is your dress made, Margaret?	
Margaret:	Gingham.	
Teacher:	Your waist, Earl?	
5 Earl:	I don't know.	
Teacher:	Dorothy.	
Dorothy:	Your waist is made of percale, Earl.	
10 Teacher:	Who remembers another word that may mean either of these two materials? Frank.	
Frank:	Cotton.	
Teacher:	How did you know, Frank?	
15 Frank:	We learned about cotton in our Industrial Arts.	The entire series of questions in lines 1-43 was planned to arouse the interest and awaken the curiosity of the pupils in regard to cotton clothing. By recalling past experience, and emphasizing present state of mind, this interest and curiosity served to motivate the work which followed. In this series of questions and answers the following laws are demonstrated: (1) Readiness, Exercise, and Effect; <sup>24</sup> (2) Apperception; <sup>25</sup> (3) Interest and Attention; <sup>26</sup> (4) Motivation; <sup>27</sup> (5) Recall; <sup>28</sup> (6) Association <sup>29</sup> (Line 33); and (7) Inference <sup>30</sup> (Line 39).

<sup>19</sup> Thorndike, *Principles of Teaching*, pp. 12-17.

<sup>20</sup> Colvin, *The Learning Process*, p. 269.

<sup>21</sup> Thorndike, *Briefer Course*, p. 144.

<sup>22</sup> Colvin, *The Learning Process*, p. 154.

<sup>23</sup> Colvin, *The Learning Process*, p. 205.

<sup>24</sup> Thorndike, *Briefer Course*, pp. 53, 98, 172.

<sup>25</sup> Thorndike, *Principles of Teaching*, pp. 42-43. Parker, *Methods of Teaching in High Schools*, p. 300.

<sup>26</sup> Thorndike, *Principles of Teaching*, pp. 55 and 105. James, *Principles of Psychology*, Vol. I, p. 572. Dewey, *Interest and Effort*, pp. 7-24. Strayer, *Brief Course*, p. 25-26.

<sup>27</sup> Miller, *Psychology of Thinking*, pp. 107-108. Charters, *Teaching the Common Branches*, pp. 226, 328.

<sup>28</sup> Miller, *Psychology of Thinking*, p. 132. Colvin, *The Learning Process*, p. 131.

<sup>29</sup> James, *Principles of Psychology*, Vol. I. p. 566.

<sup>30</sup> Dewey, *How We Think*, p. 26.

Teacher: How many of you children have on some article of clothing made of cotton?

Margaret: My dress.

20 Elmira: My apron.

John: My waist.

Earl: This sweater is made of cotton.

25 Teacher: Of what material are sweaters usually made?

Earl: They are usually made of wool, because it's warmer.

Dorothy: We all have on underwear made of cotton.

30 Teacher: What helped you to remember that so much underwear is made of cotton?

Dorothy: Our visit to the Monarch Underwear Factory.

35 Teacher: If you could visit every schoolroom in this city, do you think you might find all the pupils wearing cotton?

Nellie: If we could visit Toledo, too, we should find that all the Toledo children wear cotton.

40 Harriett: I think nearly everybody wears cotton.

Teacher: Where does so much cotton come from, Homer?

45 Homer: It comes from down south.

Teacher: How many would like to know more about it? Open your geographies to page 246, Figure 315. Here is a picture that tells a story about cotton. Each little square represents a country. Who can tell which square represents our country?

50 55 That's easy, isn't it?

Elmira: Why do you suppose the United States is represented by such a large square?

Here begins the solution of one of the minor steps in the larger unit.<sup>22</sup>

The question coming after interest has been aroused serves to put the class in the proper attitude; to give the mental set or purpose necessary for further procedure: (1) Readiness;<sup>23</sup> (2) Intellectual Curiosity;<sup>23</sup> (3) Visual Imagery;<sup>24</sup> (4) Vividness.<sup>25</sup>

Lines 47-55 are another illustration of a small unit of reflective thinking necessary to satisfactory procedure. It will be noted that in line 57 a pupil raised the problem, because she

<sup>22</sup> McMurry, *How to Study*, p. 92.

<sup>23</sup> Thorndike, *Briefer Course*, pp. 53, 98, 133.

<sup>24</sup> Dewey, *How We Think*, p. 32. Colvin, *The Learning Process*, p. 58.

<sup>25</sup> Thorndike, *Principles of Teaching*, p. 90. Watt, *The Economy and Training of Memory*, p. 93, 94.

<sup>26</sup> James, *Principles of Psychology*, Vol. I, p. 575. Colvin, *The Learning Process*, p. 149.

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60	Earl:	It's the most important country in the world.	felt the <i>need</i> of knowing; and that the class made the decision in Line 74. The laws here involved are: (1) Reason; <sup>**</sup> (2) Analysis, Comparison, and Selection; <sup>**</sup> (3) Partial Activity (Lines 67 and 68); <sup>**</sup> (4) Social Approval; <sup>**</sup> (5) Cooperation. <sup>**</sup>
	Teacher:	Would a Chinese boy agree with you?	
65	John:	He would probably think his country was the most important.	
	Teacher:	What was our picture about?	
	Earl:	About cotton.	
70	Teacher:	Then why is the United States represented by the largest square?	
	Earl:	Does it raise more cotton than any other country?	
75	Teacher:	What do you think, class? Is his answer reasonable? Does our picture tell us any more about cotton? Elmira.	
	Elmira:	One of those bales weighs 500 lbs.	
80	Teacher:	Can you tell anything about the size? Dorothy.	
	Dorothy:	It looks quite heavy, and is as tall as the man.	
85	Teacher:	At the top of the square is a very large number. Let's put it on the board and read it. John.	
90	Teacher:	That means that every year in the United States there are 10,631,000 bales of cotton raised. Do you have any idea how much that would be? If the bales were placed close together, they would fill	

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Lines 78-90 illustrate the collection of data.<sup>\*\*</sup>

<sup>\*\*</sup> James, Principles of Psychology, Vol. II, p. 329.

<sup>\*\*</sup> Thorndike, Principles of Teaching, pp. 133, 147.

<sup>\*\*</sup> Thorndike, Briefer Course, p. 135; Thorndike, Principles of Teaching, p. 147; James, Principles of Psychology, Vol. II, p. 334.

<sup>\*\*</sup> Colvin, The Learning Process, p. 286.

<sup>\*\*</sup> Strayer, A Brief Course, 130; Dewey, Moral Principles, p. 27.

<sup>\*\*</sup> Colvin, The Learning Process, p. 315; Strayer, A Brief Course, p. 89-90.

95	all the space from Court Street to Wooster Street and from the Normal College to Main Street. I think they might be piled as high as the tree tops in that same space; and still there would not be room for all of the cotton that is raised in the United States in one year.	Placing the large number (10,631,000 bales) on the board made provision for individual differences in sight and hearing;* and also served to vary the presentation, thus making a stronger appeal to interest. The teacher's illustration of piling the cotton bales in a well-known space (Lines 88-104) uses the following laws: (1) Vividness;* (2) Imagination;* (3) Making work concrete.*
100		
105	Turn to page 122. Last paragraph above fine print. "More than one half of all the cotton raised in the world is grown in our Southern States."	
110	What does that make you want to know? Margaret.	The pupils have become so interested that they are conscious of the problem; and they are guided in the statement of the problem, that it may be concise.*
	Margaret: Why does the United States raise so much cotton?	
115	Teacher: Can anyone word it better?	
	Frank: Why does most of the cotton used in the world come from our Southern States?	The pupils were given opportunity for analysis and selection, and evaluation.*
		The pupils having decided that Frank's statement of the problem was acceptable, the teacher then appealed to individual differences, and also used the law of vividness by putting the problem on the board. The whole situation was made clearer by the reference (Lines 124-129) to problematic situations in Arithmetic: Law of Analogy.*
120	Teacher: Which do you think has shown more careful thought, Margaret or Frank?	
	Then we'll put Frank's question on the board. That's a problem for us. We can have problems in geography as well as in arithmetic. What do we do with a problem in arithmetic? Class.	
125		
	Class: We work it.	
130	Teacher: We use another word, sometimes, that means the same. We <i>solve</i> it. How many would really like to solve this	In lines 130-133 the teacher begins an enlargement of the pupils' vocabulary by relating the new word to an old or

\* Colvin, The Learning Process, pp. 77-80, 169-177; Watt, The Economy and Training of Memory, p. 93.

\* James, Principles of Psychology, Vol. I, p. 575; Colvin, The Learning Process, p. 149.

\* Charters, Teaching the Common Branches, p. 232.

\* Charters, Teaching the Common Branches, p. 341.

\* Miller, Psychology of Thinking, pp. 92 and 108; Parker, Methods of Teaching in High Schools, p. 185; Charters, Teaching the Common Branches, pp. 217 and 235.

\* Thorndike, Briefer Course, p. 153; McMurry, How to Study, p. 146.

\* Thorndike, Briefer Course, p. 135; James, Principles, Vol. II, p. 346.

135	problem? Read it again, Dorothy. (Dorothy reads problem from board.) Think about it for tomorrow. We're all going to help in solving it.	familiar situation: (1) Law of Apperception; <sup>11</sup> (2) Law of Association. <sup>12</sup> Here the teacher uses the law of Frequency by having the problem read again. <sup>13</sup>
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## LESSON II

140	Teacher: What is our problem for today? Earl. Earl: Why does most of the cotton used in the world come from our Southern States?	By having the problem re-read, the pupils were enabled to concentrate immediately upon the situation as it had been left the preceding day: (1) Frequency and Recency; <sup>14</sup> (2) Definiteness; <sup>15</sup> (3) Suggestion; <sup>16</sup> (4) Vividness. <sup>17</sup>
145	Teacher: I have left it on the board so that we could see it often. Have any of you thought about how to solve it?	The purpose here was to relate school work to home life. The principles involved are: (1) Social Curiosity; <sup>18</sup> (2) Motivation through instinct of approval. <sup>19</sup>
150	Margaret: I asked my mother. Teacher: That's a good thing to do. Are your parents usually interested in the things we do at school?	
155	Perhaps we shall all have something to tell at home tonight. When each one in the family has something interesting, we want to add our share.	
160	Is there another way to solve this problem besides asking some one?	
165	Mary: We might look in our geography books. Teacher: Which do you think would be a "bigger" thing to do? To	In finding different ways of solving the problem, provision was made for: (1) Multiple response; <sup>20</sup> (2) Analysis. <sup>21</sup> By allowing the class to decide which of the suggested ways was best, it gave oppor-

<sup>11</sup> Thorndike, *Principles of Teaching*, pp. 42-43; Parker, *Methods of Teaching in High Schools*, pp. 300-302.

<sup>12</sup> Colvin, *The Learning Process*, p. 136.

<sup>13</sup> Parker, *Methods of Teaching*, p. 185; Colvin, *The Learning Process*, p. 149.

<sup>14</sup> Colvin, *The Learning Process*, p. 149.

<sup>15</sup> Parker, *Methods of Teaching*, p. 185.

<sup>16</sup> Dewey, *How We Think*, p. 34.

<sup>17</sup> James, *Principles of Psychology*, Vol I, p. 575; Colvin, *The Learning Process*, p. 149.

<sup>18</sup> Dewey, *How We Think*, p. 32.

<sup>19</sup> Thorndike, *Briefer Course*, p. 31.

<sup>20</sup> Thorndike, *Briefer Course*, pp. 132, 143.

<sup>21</sup> Parker, *Methods of Teaching*, p. 188.

170	ask someone; to read from our books; or to think about it and get our own ideas? John.	tunity for: (1) Evaluation; <sup>**</sup> (2) Initiative; <sup>**</sup> (3) Verification. <sup>**</sup>
	John: All three.	
	Earl: I think we better get our own opinions first.	
175	Teacher: Then how can we tell whether we are right or wrong?	
	Dorothy: Look in our books.	
	Teacher: That is one good use to make of our books. Can you think of another?	
180	Frank: Our books will tell us some things we didn't know.	
	Teacher: Please read the problem again, Jessie.	
185	Teacher: How many of you know just where and what our Southern States are? (No Hands.) Then what do you think is the first thing we want to know before we can solve our problem? Frank.	Repetition of problem again illustrates use of the laws of: Frequency and Recency. <sup>**</sup>
	Frank: We want to know where they are.	
190	Teacher: What do you call it when you speak of where a place is?	
	Margaret: Location.	
	Teacher: Shall we make a little outline, then, to guide us in our study? What shall I name as the first point in the outline?	Here we see the value of setting up intermediary goals <sup>**</sup> and of analysis to ascertain what is the necessary element. <sup>**</sup>
195	John: I. Location.	
	Teacher: We were talking about industries the other day.	The formation of the outline for study illustrates organization of material. <sup>**</sup>
200	205 Which one of the industries studied has anything to do with our problem? (No response).	By referring to the study of industries, the law of analogy is used. <sup>**</sup>
	Teacher: From our studies in Indus-	By trying to relate the knowledge gained in a study of indus-

<sup>\*\*</sup> Parker, *Methods of Teaching*, p. 188.

<sup>\*\*</sup> McMurry, *Elementary School Standards*, p. 11.

<sup>\*\*</sup> Dewey, *How We Think*, pp. 27-28.

<sup>\*\*</sup> Parker, *Methods of Teaching*, p. 185; Colvin, *The Learning Process*, p. 149.

<sup>\*\*</sup> Thorndike, *Principles of Teaching*, p. 160.

<sup>\*\*</sup> James, *Principles of Psychology*, p. 503.

<sup>\*\*</sup> McMurry, *How to Study*, p. 106; Dewey, *How We Think*, p. 41.

<sup>\*\*</sup> Thorndike, *Briefer Course*, p. 135; James, *Principles of Psychology*, Vol. II, p. 346.

210	trial Arts can you tell us how we get cotton?	tries to our problem, the law of analysis and abstraction is used.*
Vera:	It grows in the ground.	
Teacher:	What do we call the industry that deals with raising things from the soil?	
215		
John:	Agriculture.	
Teacher:	That's a big word. What is another word that means the same?	
220	John: Farming.	
Teacher:	We'll put both words in our outline to help us remember. II. Farming or Agriculture. What influences farming?	
225	Dorothy: I don't know.	
Teacher:	Do you know what I mean by the question?	
Dorothy:	No.	
230	Teacher: Who will suggest to Dorothy what she might have done, to have been more helpful to herself and to the group?	An appeal is made through the instinct of approval.*
Frank:	Dorothy, you should have told Miss M. that you didn't understand what she meant by the question.	
235		
Teacher:	What things help or hinder farming, or the raising of crops?	Lines 237-265. The entire procedure uses the laws of Analysis and Selection.*
240	John: Rain.	
Margaret:	Sunshine.	
Teacher:	What does the sun give us?	
Margaret:	Light and heat.	
245	Teacher: When we speak of how warm a place is, or of how cool it is, what word do we use? (No response.)	
Teacher:	When I look at the thermometer, what am I trying to learn?	
250		
Dorothy:	The temperature of the room.	
Teacher:	We use the same word in speaking about heat and cold in regard to places.	
255	What two things have we	

\* James, Vol. I. p. 504-505.

\*\* Thorndike, Briefer Course, p. 31.

\*\* James, Principles of Psychology, Vol. I, p. 504; Colvin, The Learning Process, p. 135.

	found that <i>influence</i> farming? Dorothy.	
Dorothy:	Rain and temperature.	
Teacher:	What one word may mean the same?	
260 Frank:	Climate.	
Teacher:	If cotton has to be raised, and climate has an influence on farming, what does that have to do with our problem?	
265 John:	We must find out about the climate of the Southern States.	An illustration of a pupil forming an hypothesis."
Teacher:	From your reading in that interesting little book, "The Four Wonders," what kind of climate do you think cotton needs?	The reference to the book which had previously been read uses the laws of: (1) Association; <sup>11</sup> (2) Supplementing of Thought; <sup>12</sup> (3) Memory. <sup>13</sup>
Mable:	It needs a warm climate.	
275 Teacher:	Do you know anything more that will help to solve this part of our problem? (No response.) Then that's a good point to keep in mind when we study. So our first point under Agriculture will be:	
	1. Climate a. Rain b. Temperature	
285	What other <i>things</i> will influence agriculture? I am going to say that in another way and mean just the same thing. What other <i>factors</i> will influence agriculture?	Analysis, selection, and organization continue; also the enlargement of vocabulary.
290 Jessie:	Jessie.	
295 Jessie:	The kind of land. If it's rich land, the farmer has good crops.	
Nellie:	We call the land soil.	
Teacher:	Does anyone know what kind of soil cotton needs?	
Frank:	Cotton needs rich soil.	
300 Teacher:	What word may we use instead of rich?	

<sup>11</sup> Dewey, *How We Think*, p. 94.

<sup>12</sup> James, *Principles of Psychology*, Vol. I, p. 566.

<sup>13</sup> McMurry, *How to Study*, p. 73.

<sup>14</sup> Miller, *Psychology of Thinking*, p. 132; Colvin, *The Learning Process*, p. 131; Watt, *The Economy and Training of Memory*, p. 21.

	John: Fertile soil.	
305	Teacher: What do you suppose we shall find out about the soil of the Southern States?	This question illustrates again the importance of leading pupils to form inferences.*
	Frank: It surely must be fertile.	As the pupils respond to various elements in the situation, the law of partial activity is illustrated.**
310	Teacher: Let us put that in our outline as another sub-topic under agriculture. 2. Soil. Is there anything else that might influence farming besides: 1. Climate; 2. Soil?	
	Earl: Farmers don't want hilly land.	
315	Teacher: To place that in our outline what word shall we use to express the kind of land, either hilly or level?	
	Margaret: Surface.	
320	Teacher: Good! What kind of surface would you think a farmer would want in order to have a good cotton crop?	
325	Homer: Not too hilly, and not too level.	
	Teacher: Now we have a good start for work. We have each one helped by giving our own ideas. What may we do next?	
330	Dorothy: We might see now what our geographies say.	Pupils were being trained in verification.**
	Mable: We may prove whether we are right or wrong.	
335	Teacher: Here is your outline: I. Location II. Agriculture or Farming 1. Climate a. Rain b. Temperature 2. Soil 3. Surface	
340	How shall we begin to study location?	
	John: Use the colored map.	
345	Teacher: How shall we know where to find the map?	
	Frank: Turn to the index and look for Southern States.	

\* Dewey, How We Think, p. 26; Parker, Methods of Teaching, p. 195.

\*\* Thorndike, Briefer Course, p. 135; Thorndike, Principles of Teaching, pp. 147-148; James, Principles of Psychology, Vol. II, p. 334.

\*\* Thorndike, Principles of Teaching, pp. 156-157.

	Teacher: The index is rather long. Can you give us a better help?	
350	Margaret: In the index there is a part called "List of Colored Maps." Then look for Southern States.	
355	Teacher: When you have found it, stand. Nellie isn't ready. Who would like to help her? Now we are ready. During your study time please make a list of the names of all the Southern States.	
360	Frank: May we color some maps?	
	Teacher: What do you think you would have to know to make a really good map?	
365	Frank: We ought to know just where each state is: oh, the location.	
370	Teacher: Where shall we look to find out about the other topics in our outline?	
	Mable: Look in the index and find Southern States. Then when we find the place, it will tell us in the reading part.	
375	Margaret: The paragraph topics will help us, too.	
380	Teacher: On my desk you will find several other books that have some interesting things to tell us about cotton. Perhaps they will help us to solve our problem. Who thinks he will have time to report on an extra book? (Several wish to do that.) On the board you will find a list. (Table I) Use your index.	
385		Shows the importance of careful assignment; the value of learning how to use text-books; and supplementary books. <sup>**</sup>

TABLE I.—LIST OF BOOKS

Author's Name	Title of Book	Chapter Heading
Carpenter	North America	"In the Land of Cotton"
Chamberlain Monroe & Buckbee	How We Are Clothed Our Country and Its People Geography	"The Cotton Fields" Pages 47-53 "Southern States"
Dodge		

<sup>\*\*</sup> Charters, Teaching the Common Branches, 342.<sup>\*\*</sup> Strayer, Brief Course, pp. 88, 89.<sup>\*\*</sup> McMurry, How to Study, pp. 72-74.

### SUBSEQUENT LESSONS

These lessons, which have been reproduced verbatim, were followed by recitation periods in which the pupils reported on their study of the text; also on their reading from other authorities. Special attention was given to organization.<sup>81</sup> Great care was used in evaluating each contribution, to see that it really was a contribution toward a solution of the problem.<sup>82</sup>

The cooperative scheme in the recitation (i. e., free discussion among pupils) was very helpful in aiding pupils to feel responsible for the weighting of values, and the formation of judgments.<sup>83</sup>

At all times pupils were encouraged in the raising of questions relevant to the work, and the class was held responsible for correct answers as far as possible. Pupils were expected to cite page and paragraph to justify any contribution that they offered. This called for very careful study and a systematic taking of notes.

The problem was always kept in mind, and served as a guide in all procedure, so that thinking might be relevant and effective. Frequent attention to the outline was necessary to summarize the progress made in the solution.

Pupils were frequently asked to state the important points already decided upon, that the class as a whole might "check up" their thinking process, see what partial solutions had been reached, and realize what further procedure was necessary.<sup>84</sup>

As a special motivation the pupils were guided in the making of a chart to represent the cotton industry. Pictures and post-cards representing plantations, river-docks, sea-ports, machinery used, etc., samples of cotton materials, cotton thread, a "real" cotton boll from the South, etc., were collected and mounted, all the work being done by the pupils. On this chart was placed the best list, made by a pupil, of cotton articles in common use. The

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<sup>81</sup> Miller, *Psychology of Thinking*, pp. 94, 143.

<sup>82</sup> Parker, *Methods of Teaching*, p. 194.

<sup>83</sup> Strayer, *Brief Course*, p. 130; Dewey, *Moral Principles*, p. 14; Parker, *Methods of Teaching*, p. 193.

<sup>84</sup> Parker, *Methods of Teaching*, p. 198; Strayer, *A Brief Course*, p. 171.

making of this chart demonstrates the principle of self-expression.<sup>85</sup> The happiness of a healthy child depends upon *doing*.<sup>86</sup> The manipulative and collective instincts are given opportunity for expression;<sup>87</sup> and pupils are encouraged and guided in building up concrete imagery.<sup>88</sup>

A visit to a knitting factory where cotton underwear was manufactured from raw materials, added interest and concrete knowledge to the solution of our problem. This factory visit motivated the school work for several days in geography, English, and arithmetic.<sup>89</sup>

The previous year, these pupils had written to a boy in South Carolina, and had obtained cotton seeds. These seeds were planted in the school garden. During our study of this problem we had a real cotton plant, containing several bolls, which we transplanted from our school garden to a pot for school-room use. It furnished a fine illustration of the effect of a difference in climate, as our specimen was only about fifteen inches high, and the bolls were smaller and fewer than the average. The principles here involved are: 1. Association by correlation;<sup>90</sup> 2. Vividness;<sup>91</sup> 3. Making work concrete.<sup>92</sup>

While studying location the pupils colored individual outline maps, desk-size, of the Southern States. Careful discrimination was necessary as to exact location before a "good" map could be made to take home. A wall map and text-book maps of the United States were used as guides. A blackboard map was traced and colored by different pupils under the critical supervision of the class. As an extra project, a large wall map in out-

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<sup>85</sup> Miller, *Psychology of Thinking*, p. 31, 117.

<sup>86</sup> Dewey, *Interest and Effort*, p. 36.

<sup>87</sup> Thorndike, *Briefer Course*, pp. 20, 62; Strayer, *Brief Course*, p. 17.

<sup>88</sup> Charters, *Teaching the Common Branches*, p. 233.

<sup>89</sup> Strayer, *A Brief Course*, p. 135.

<sup>90</sup> Thorndike, *Principles of Teaching*, p. 7; Charters, *Teaching the Common Branches*, pp. 225, 227, 333.

<sup>91</sup> James, *Principles of Psychology*, Vol. I, p. 575; Colvin, *The Learning Process*, p. 149.

<sup>92</sup> Charters, *Teaching the Common Branches*, p. 341.

line was an ever ready stimulation to study location; a pupil being permitted to color only the states which could be accurately named and located. This work with maps uses the manipulative and constructive instincts, and appeals to interest through pleasurable activity.<sup>93</sup>

Collections of post-marks from Southern cities were an added incentive, as pupils pasted the post-mark in its appropriate place on the wall map.<sup>94</sup>

Various games were introduced to motivate the drill on location. For example, the class was divided into two groups and a pupil was chosen as leader of each group. The leader called the name of a state; and the first one to point to that state on the wall map won a point for his division. This competition involves the group idea rather than individual rivalry, and arouses the keenest interest.

The laws here used are: 1. Play instinct;<sup>95</sup> 2. Motor Activity and Emulation;<sup>96</sup> 3. Memorizing through Drill.<sup>97</sup>

The pupils had free access to a stereoscope with pictures of cotton fields, cotton manufactories, etc., as well as numerous charts which added interest and concrete illustration to the work.<sup>98</sup>

It is very difficult to follow the solution of just one problem when it is but a part of a project that may call for the solution of many problems. The correlation of the different subjects must of necessity be interwoven, in order that the pupils may see the problem in its relation to real life.<sup>99</sup>

Other problems were subsequently introduced, and a corresponding collection, organization, and evaluation of data was followed until the class as a whole had learned the most significant geographical facts concerning the Southern States.

<sup>93</sup> Thorndike, *Principles of Teaching*, p. 25; Colvin, *The Learning Process*, p. 37; Strayer, *A Brief Course*, p. 17.

<sup>94</sup> Thorndike, *Briefer Course*, p. 20.

<sup>95</sup> Colvin, *The Learning Process*, p. 57; Charters, *Teaching the Common Branches*, pp. 228-238.

<sup>96</sup> McMurry, *How to Study*, pp. 190-191; Miller, *Psychology of Thinking*, p. 30; Charters, *Teaching the Common Branches*, p. 238.

<sup>97</sup> Charters, *Teaching the Common Branches*, p. 228.

<sup>98</sup> Thorndike, *Principles of Teaching*, p. 210.

<sup>99</sup> Thorndike, *Principles of Teaching*, p. 7; Charters, *Teaching the Common Branches*, pp. 225, 227, 333.

Pupils gained steadily in powers of evaluation, and in delicacy of discrimination and expression; but the most important gain was in the fact that a problem of real life interest was solved in a psychological manner, and that the habit of logical thinking was being unconsciously acquired by the pupils.

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## WHAT LOS ANGELES IS DOING WITH THE RESULTS OF TESTING

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The editorial headed "The Next Step After Testing" which appeared in the December, 1920, number of the *JOURNAL OF EDUCATIONAL RESEARCH* is timely. It is clear that if somebody doesn't answer the insistent question: "What shall we do with these results?" the measurement of classroom instruction will be included in the history of education rather than in modern practice.

Perhaps no city in the United States so strenuously opposed the introduction of so-called "scientific education" as did the city of Los Angeles. The opposition was not confined to a "little group of wilful men" or women, nor was it directed toward tests and measurements; rather it was a general objection to any interruption of the even tenor of schoolroom procedure; and, of course, the greatest noise was made by those who had the least information. The prevailing attitude might have led one to suppose that educational and psychological tests were usually composed in the darkroom of a rat-infested laboratory by some "exchange professor" who could not speak English. Undoubtedly there was a firm-rooted conviction that the results of tests were as indeterminate as a sentence of "two to twenty-one years in the penitentiary."

The task of converting these "sinners" was assigned to Robert H. Lane, himself a principal, who, as the new director of the research division, worked out a system by which he was not only to enlist the services of principals and teachers but also to devise a few tests, thereby at least disproving the belief that such instruments are only produced in laboratories. With the gradual growth of the research division, there arose an evident need for a psychological examiner, and particularly for one who would be able to convince certain "conscientious objectors" that a psy-

chologist is really able to discriminate between a subnormal and an abnormal child. For that adventure in diplomacy Dr. Arthur H. Sutherland, who had not only been trained in psychology but in certain fields of medicine, was called from Yale to minister to the needs of the fit, misfit, and unfit.

The credit for the success of the program of scientific measurement undeniably belongs to the two men named. They have been aided by the undivided support of the entire administrative forces and, more recently, by the generous assistance of principals and teachers. Serious objection to tests and measurements has broken down, and the schedule now in effect is the real subject of this article.

#### AN INTELLIGENCE SURVEY

As a result of a suggestion set forth in the preliminary survey of the Los Angeles public schools by Dr. W. A. Jessup and Dr. Albert Shiels in 1915, the superintendent in 1917 asked the psychologist to undertake the supervision of ungraded rooms.<sup>1</sup> At that time there were about ninety such rooms scattered over a wide area, housing approximately two thousand children. In June 1917, an intelligence survey was made in order to determine the number of those who should be accommodated under different divisions. School records and health cards of children were collected; the testimony of teachers and principals was recorded; and the Binet Test was given to about two thousand children.

The children to be given the examination were selected as follows: all the members of ungraded classes from twenty-four elementary schools; one-third of the group which had failed on the previous midyear examinations (selected alphabetically); and the enrollment of two parental schools. In the ungraded rooms 70.4 percent were found to be three or more years mentally retarded; in the non-promotion group the corresponding figure was 34.3 percent; and in the parental schools it was 81 percent. It was estimated that 5,000 children in Los Angeles possessed

<sup>1</sup> Evidently from what follows the term "Ungraded" is not, as is often the case, applied to rooms or classes for mentally defective children.—Editor.

an intelligence too low to profit by the methods of education used in regular and ungraded classes.

The age-grade retardation, in June 1917, showed 13,600 pupils who were two or more terms retarded. Juvenile court records were examined as to school relations, i. e., the number of children from each school and the type of offense. A record of the mentality of these children was not available but, through the state reformatory, it was found that children with a mentality just above 70 (I. Q.) have shown the same characteristics in behavior on probation, at work, and in the institution, as have those just below 70. It is this class which furnishes a large proportion of truancy and disciplinary cases in school and in the juvenile court.

It was the conviction of the teachers, as well as of the psychologist, that many of the children who tested low mentally (some with intelligence quotients below 70), have abilities which make it entirely possible to bring them up to an efficient school level. It therefore became necessary to devise a plan of segregation and a plan of education following segregation which would recognize this fact so far as it is well founded. The plan which was set forth at that time and which has not been altered materially, except for purposes of expansion, was described as follows:

#### THE UNGRADED ROOM

The following ideal seems the logical conclusion as to the best use of the Ungraded Room:

*First*—There should be the following different types of rooms, limited to an attendance of twenty pupils:

- (a) To prepare the child for second, third or fourth grade. (Primary Adjustment.)
- (b) To prepare the child for the fifth, sixth or seventh grade. (Upper Adjustment.)
- (c) A Foreign Ungraded Room for backward children of foreign parentage; for those children who have tried and failed in grades one and two. (Primary English Adjustment.)
- (d) A Foreign Ungraded Room for those recent arrivals to the city who have some education in their own language. (Upper English Adjustment.)

*Second*—Each child should be given a time limit in the room. This means that a child enters the Ungraded Room for a specific reason, and that reason is, that by entering this room, he will have an opportunity for promotion or advancement one grade, which otherwise would be denied to him on account of the rigidity of the grades. The intent, therefore, is that a child should enter the Ungraded Room in order to work his way into a grade, by specializing on studies or activities in which he is backward. Each child who fails to work his way into a grade should be made the subject of special study, with the expectation that if he does not find what he needs in the Ungraded Room, he will be taken care of in a special room. The time limit should be not over one term, that is, a child who is a candidate for admission to the Ungraded Room should be very carefully scrutinized, to determine whether it is likely he will be able to get out of the Ungraded Room in less than one term.

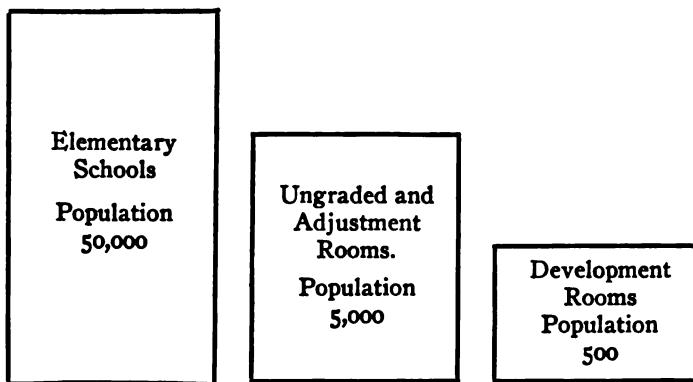
*Third*—School district lines should be disregarded for Ungraded Rooms. Any child may be sent to a neighboring district, where there is a room devoted to the level of work needed by him. Each such room should have a waiting list.

*Fourth*—Each Ungraded Room teacher should learn to give, and should give, the educational and psychological tests; first on entrance, and then at frequent intervals thereafter, to determine the progress; and, finally, promotion should be made strictly upon the basis of performance in tests of arithmetic, reading, spelling, writing, geography, etc.

*Fifth*—The greatest opportunity to show results and to handle an extra number of pupils during the year should attract the best teachers in the schools. The rapidity with which the individual child can be inspired to work for himself, and by himself, toward definite objectives, will not only be a real test of teaching ability, but will also offer a means whereby the teacher can measure her own ability.

To organize the Ungraded Rooms, three preliminary steps were necessary: (1) The examination and segregation into Development Rooms of those whose progress was abnormally slow; (2) the elimination of disciplinary cases over fourteen years of age; (3) the training of teachers in an educational plan for Adjustment Rooms which might achieve educational results.

These steps having been taken in any limited district of 12 or 15 schools, there is a basis for automatically sifting the pupils and placing them according to their scholastic capabilities. This may be shown diagrammatically.



The misfits (both those who are keen and quick and who will be injured by the slow progress of the grades, and those who are too slow to keep up with the grades) by school tests and measurements, are detected and sent to

**Ungraded and Adjustment Rooms.**  
By Individual Diagnosis there is a separation of those who can by proper methods soon be returned to the grades when the obstacles are removed or diminished and those who need

**Development Rooms**  
where everything that modern education can do for a child is done. From here he goes to the great outside world and unfortunately is too often lost sight of.

In the fall of 1918 nine development rooms were being operated for atypical children, the enrollment of the higher type of such pupils becoming so large at one school that five teachers were employed to care for this work. In 1919 the number of applications for the organization of classes for mentally defective children became so great that it was necessary to open rooms in regular schools to care for children who were too much of a burden or annoyance in the grades.

The question: "What shall we do with these results?" is therefore partly answered when it is shown that the results of the Binet Test were immediately used in the installation of an educational program for children who registered need for special instruction. All children were and are given every oppor-

tunity to learn anything that they can learn and use. All are given a chance to learn to read, write, spell, add, subtract, etc. Special practice material has been placed in the hands of the teachers of these children, and the teachers have been encouraged not merely to give an exceptional amount of drill to pupils, but also to keep a record of the success in practice, and through these figures to note the progress. Special emphasis is placed upon physical activity.

Many of the mentally defective children will work steadily at anything which is given them to do. There has been no difficulty with the drill methods; but better success has been attained in the classrooms where the teachers have been inventive and enthusiastic in getting up competitions, races, and other examples of rivalry. Nearly every teacher has invented something which has been designed to inspire the pupils to livelier activity.

#### ADJUSTMENT ROOMS

It is the purpose of the Adjustment class to conserve all the real abilities of pupils who are now failures and to encourage them to reach a higher educational level before leaving school. In one district these classes are now giving opportunity for more rapid progress to pupils who were making little advance for various reasons. These rooms are of four kinds: (1) Primary Adjustment Rooms for pupils preparing for grades two, three, and four; (2) Upper Adjustment Rooms for pupils preparing for grades five, six, and seven; (3) Primary English Adjustment Rooms for non-English speaking pupils who are illiterate; and (4) Upper English Adjustment Rooms for non-English speaking pupils who have had three or more years of education in a foreign language.

The principal assigns pupils to these rooms from waiting lists, prepared by the supervisor of the adjustment work. When the first Ungraded District was reorganized it was at once apparent that a pupil might have to go to an adjacent building to use the type of room he needed, so district boundary lines have had to be disregarded. A room thus often functions for several schools.

The number of pupils in these classes is usually twenty. Perhaps a maximum of eighteen pupils in primary and twenty-two in upper classes would expedite the progress of pupils back to regular grades. A room serves sixty pupils per year. For this reason, the time of each pupil is limited chiefly to the work in

which he is retarded, with the exception of ninety minutes per week given to manual work.

The educational plan for this adjustment work is not a "teaching" plan but a "learning" plan. While a few short class exercises are necessary, the greater part of the day is used as individual learning time. To provide a course of study by which each pupil can progress independently and unhindered by the rates of other pupils, the academic essentials of the grade curriculum are classified under three heads, according to the kind of mental activity involved:

(1) Thought comprehension or interpretation, called "reading," but including the comprehension part of reading, arithmetic, geography, history, etc.; (2) "written expression," including written language, spelling, etc.; and (3) "numbers," limited to the mechanics for the acquisition of arithmetical skill. This classification of subject matter is the first feature

TABLE I.—REPORT AS TO THE PROGRESS OF THE FIRST AND SECOND HUNDRED PUPILS HELPED IN ADJUSTMENT ROOMS

AVERAGE NUMBER OF WEEKS OF PRO- GRESS PER WEEK	NUMBER OF PUPILS IN	
	FIRST HUNDRED	SECOND HUNDRED
0	6	7
1	2	2
2	4	16
3	14	16
4	20	21
5	14	9
6	9	5
7	13	7
8	6	3
9	2	2
10	4	3
11	1	3
12	0	0
13	1	2
14	0	1
15	3	0
16	0	2
17	0	1
18	1	0

peculiar to this plan. For each of these three learning "activities" a progress outline in natural educational steps has been arranged from the simplest to the most difficult projects in A6 work.\*

#### SUMMARY

Two hundred pupils averaged 1016.92 weeks' work per week or 5.08 times as much progress as regular children in regular grades. After a short trial, sixteen pupils (5 percent) were returned to grade on account of absence, lack of application, defective or weak vision, etc. Sixty-one pupils (30.5 percent) left the city before the end of three months' period in the grade. Five pupils (2.5 percent) were transferred to Development Schools. Twelve pupils (6 percent) were reported not sufficiently prepared. One hundred twelve (56 percent) were reported satisfactory.

The average length of stay in a room was thirteen weeks. This means, then, that in thirteen weeks on the average the children learned how to study, corrected their deficiencies, and were promoted over one year.

In order to carry on such a far-reaching program the Division of Research was forced to enlarge its personnel. This was done as the demand arose. At the time of this writing, besides the director, there is a director of secondary research, four survey teachers, a secretary, a clerk, and a multigraph operator. The board of education has appropriated thousands of dollars for the promotion of research and is demanding that something be done with the results secured from testing.

Under the present program, the survey teachers, who were selected from the local teaching staff and trained for the work, are giving the Holley Picture Completion Test to first-grade children, the Haggerty Sigma I to second- and third-grade children, and such other tests as the Stanford Revision of the Binet, the Pintner-Paterson Performance Test, the Porteus Tests, the Indiana Mental Survey Test, the National and the Otis Intelligence

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\* The principals' committee on Promotional Standards has adopted this form for the grades.

Tests. Third- and fourth-grade children are given the Lane Arithmetic Test; the Courtis Arithmetic Tests are given from grades V to VIII, and the Monroe Silent Reading Tests from grades IV to VIII. Besides these the adjustment-room teachers give "placement tests" designed in the local division.

#### SECONDARY RESEARCH

A few educational and intelligence tests had been given promiscuously previous to this school year (1920-1921), but in October, 1920, the work in senior and junior high schools was reorganized; and it is gradually being developed to fit into the plan used in the elementary schools. Testing was begun by examining 2,000 members of the R. O. T. C. in seven high schools and one junior high school.

During the war psychologists attempted, sometimes in vain, to get army officers to use the results of army psychological tests. Such officers were far more antagonistic than teachers have ever been. But it is easier sailing in the local R. O. T. C., since the instructors are a happy combination of teachers and officers. They have been using the results to help determine promotions and recommendations for summer camps. It may surprise some army psychologists to know that Army Alpha was given to the local units at the request of the commandant, a retired colonel who saw service in the recent struggle.

During the fall the department of secondary research was assigned the problem of running down the causes for failure among high-school students. It was thought best to begin the problem by making a typical survey of mental ability. The IX-A pupils of the junior high schools were selected as a typical group. They were given the Terman Group Test of Mental Ability, all tests being given and all papers being scored by the director of the secondary department.

Since the problem was a large one, it was not possible to stop there and ask: "What shall we do with these results?" Of course the median scores were run off, and they, with the indi-

vidual scores, were furnished to each school. No instructions were sent out, but the papers were reserved to be discussed by the teachers in called meetings. No opportunity was given for hasty criticism or approval of the tests.

When the preliminary reports were completed, the school marks of the same pupils were tabulated in English, mathematics, history, and science (the subjects most directly concerned in the test), and in general average. In order to ascertain whether teachers were recognizing mental ability in the awarding of school marks, correlations were computed between marks in those subjects and mental ability. This was followed by a check of failure marks in the same subjects. By grouping the median scores in mental ability, coefficients of correlation, and percents of failure, it was possible to suggest to superintendents and principals that standards of marking in certain schools were too high or too low.

#### A NEW MARKING SYSTEM

Naturally such investigation invited attention to the marking system in use in Los Angeles. There is no indication of a great amount of satisfaction with the marking system. It has been a 5-point system in which "1" is high, "2" is good, "3" is passing, and "5" is failure. The number "5" is given to those pupils who register below 70 percent; but the number "4" is given to those pupils who register below 70 and may make up their work, and also to those pupils whose potential mark is higher on the scale but who have failed to complete all the work required. Lack of concrete definition has made such a system almost impossible of standardization. At the time of this writing the association of principals is considering alterations, and it is not improbable that a system based upon the normal curve of distribution will be formulated and accepted.

Further attention has been called to the rating scale for teachers. It is not anticipated that the results of tests in the classroom will produce agitation for a standardized rating scale, but such a scale promises to be a much happier solution than the

actual testing of the teachers themselves. A scale, based upon the Army Rating Scale, is being considered.

Meanwhile testing for mental ability has been carried on, having been extended to all pupils from the first to the ninth grades inclusive and to the twelfth-grade pupils. The latter are being tested at this time in cooperation with Dr. Terman, who is conducting a state-wide survey of the mental ability of high-school seniors, looking toward the use of mental ability scores in educational and vocational guidance.

It is evident that such extensive examination could not be conducted by the director alone; and a chief examiner has therefore been appointed in each junior and senior high school. This examiner has been selected by the principal; and he is required to have certain qualities, such as good voice, accurate performance, and the ability to maintain good discipline. To assist the chief examiner a limited number of teachers are chosen who will help in giving the tests and in scoring the papers. A pupil's score and mental age will be listed on his transfer card and each teacher will be supplied with a personal-history card of each pupil in his class. The personal-history card will contain the name, age, mental-ability score, mental age, health rating, and scholarship record.

Superintendent Dorsey has recently subscribed to the extension of measurement work, and plans may materialize whereby the division of research will have a supervisor of development schools and an individual examiner for secondary pupils of inferior mental ability. Then, too, much is anticipated in the prospect of concentration on the problem of vocational guidance through testing.

Research work in Los Angeles has been promoted on the assumption that we must first measure the general mental ability of the child before we can use the results of educational tests intelligently. As Dr. Buckingham points out, the university professor is not usually in a position to recommend improvement in instruction through the tests he advocates. The administering of such tests does not include the improvement of instruction, but merely the measurement of instruction. But that fact does not

preclude improvement; the problem has been put up to superintendents and supervisors; yet, undoubtedly, the task is one for research workers in the field.

The director of research is able to measure and interpret, but he must not stop there; he must recommend improvement. No far-reaching recommendations can be made on the results of intelligence tests alone, since an intelligence test is in no wise the last word in the dictionary of measurements. There is need of a finer diagnosis, and the educational test serves and will serve that purpose. It is now possible, through the use of educational tests, to place a finger on the difficulty which the individual child meets in the particular subject he has undertaken to learn. There is some difference of opinion concerning the effort to be made to carry him over his difficulty, but there is always the necessity of attempting to teach him according to his capacity.

Undoubtedly there is a place for the educational test which measures the group. It is good to know how class compares with class, school with school, and city with city. But that sort of test has produced that perplexing question: "What shall we do with these results?" What Los Angeles is trying to do just now is to select the best of the group tests, use them, and file the results; what she needs more than anything else in this field is more diagnostic tests, so that it will be possible to ascertain when a given pupil is weak in words or music and why. A combination of mental ability tests, educational group tests, and educational and psychological diagnostic tests, should place the research director in a position to answer the question raised.

The future of "scientific education" in Los Angeles depends upon the training of principals and teachers in the art and practice of scientific measurement. To meet that issue, the superintendent is insisting that principals attend courses in measurement, and the directors are devoting much time to lecturing to teachers on the same subject. Three of the local universities are now offering courses in tests and measurements, with the basic idea of defining their possibilities and limitations. Now that the main body of objections to tests has been eliminated, the biggest danger

Los Angeles confronts is that of allowing western enthusiasm to "start a drive" to increase her quota of claims for the results of testing. Tempered with a degree of conservatism, it is not going to be extremely difficult to find use for the results of testing when they are achieved.

## INTELLIGENCE TESTS IN THE PRIMARY GRADES

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There has long been evident a wide-spread dissatisfaction with the current methods of grading and promoting pupils. This has been particularly true in the kindergarten and primary grades, where the nature of the work makes it impossible to secure as tangible evidence of success or failure as can be had in the advanced grades. Large differences in native ability exist among the children of any group, and this must be taken into account in the grading of all pupils, even of those in the kindergarten. While crowded classes and lack of special rooms for the more extreme cases are generally a handicap, this fact does not prevent the introduction of many desirable improvements.

In an effort to formulate some definite, tangible standards for measurement of native ability in children, many types of intelligence tests have been evolved. None of these are infallible, but sufficient evidence is accumulating to prove that they are of real value.

During the past three years and a half, a careful, systematic application of intelligence tests has been made in the schools of Council Bluffs, Iowa. The purposes of the experiment have been: (1) to obtain a better basis for promotion from kindergarten to first grade; (2) to enable pupils to advance more nearly according to their native ability; (3) to aid in the analysis of failures; and (4) to cooperate with Doctor Terman, of Stanford University, by applying his methods in wholesale fashion in a typical school situation.

The test used was the Stanford Revision of the Binet-Simon Intelligence Test. The testing was done on Saturdays at the various buildings by specially trained teachers. The average time required for testing a normal six-year old child is about 30 minutes. Of course the time varies with individuals, as it is

vital that the examiner get into *rapport* with the child before the real testing begins. The work requires persons of tact, patience, thoroughness, and superior intelligence. No one should attempt to test children when physically incapacitated or under any mental tension.

Changes have been made from time to time in the application of the tests in Council Bluffs and others will undoubtedly be made as more data accumulate upon which to base decisions. Doctor Terman has been consulted frequently during the experiment and several of the teachers, as well as Superintendent Saam, studied and tested under him personally.

Some instances are found where the work done by a child does not correlate with his intelligence quotient. One who tests high may do only mediocre work and one who tests somewhat below average may do very good work. These discrepancies are usually readily explained, and ordinarily do not occur in the case of more than 15 percent of the children tested. It is safe to say that approximately 85 or 90 percent do work that agrees fairly well with the intelligence quotient, and that when the test results are used in connection with the regular school tests they furnish a very definite basis for gradation.

Occasionally a child of high native intelligence lacks definitely the power of application. In a large class such a pupil must be left to his own resources, whereas, during the test, he has the undivided attention of the examiner. Again, such children may possess unusual ability in some special field and fail to react to the regular school tasks through absorption in one subject. Physical disability and lack of proper home environment may also account for some of the low test scores. Children also sometimes fail to manifest their real innate ability when tested because of self-consciousness, or language handicap.

Table I suggests that variability in intelligence is continuous and that no definite dividing line can be drawn between normality and feeble-mindedness; also that for every child of any degree of deficiency, there is another of superior ability. It will be noted that the median intelligence quotient of this large group

TABLE I.—THE INTELLIGENCE QUOTIENTS OF 2360 PRIMARY CHILDREN COMPARED WITH THOSE OF TERMAN'S 905 UNSELECTED CHILDREN (5 YEARS TO 14 YEARS OF AGE)

INTELLIGENCE QUOTIENT	905 UNSELECTED CHILDREN (PERCENTS)	2360 PRIMARY CHILDREN OF COUNCIL BLUFFS (PERCENTS)
56-65	0.3	1.8
66-75	2.3	4.5
76-85	8.6	10.3
86-95	20.1	22.3
96-105	33.9	27.0
106-115	23.1	22.1
116-125	9.0	8.4
126-135	2.3	2.8
136-145	0.5	0.8

is almost exactly 100, indicating that the Stanford Revision, at least in that range of the scale used in testing primary pupils, is standardized at the right degree of difficulty. Agreement with school work is shown in Table II and III. The data of Table II are for 2360 children in kindergarten and primary grades at Council Bluffs for the semester ending February, 1919.

TABLE II.—QUALITY OF SCHOOL WORK IN RELATION TO INTELLIGENCE QUOTIENTS (ENTRIES ARE IN PERCENTS)

QUALITY OF SCHOOL WORK	INTELLIGENCE QUOTIENTS		
	56-85	86-115	116-145
H	0.5	9	24
A	10.0	31	51
B	29.0	34	16
C	60.5	26	9
	100	100	100

NOTE: H = Honor students, highest 10 percent in class.  
 A = Strong students, next 30 percent of class.  
 B = Medium, next 30 percent of class.  
 C = Poorest, remaining 30 percent of class.

TABLE III.—QUALITY OF SCHOOL WORK OF 200 CHILDREN WHOSE INTELLIGENCE QUOTIENTS WERE 115 OR OVER WHO WERE PROMOTED TO THE FIRST GRADE FROM THE KINDERGARTEN BEFORE THE AGE OF SIX

QUALITY OF SCHOOL WORK	PUPILS RECEIVING EACH RATING, JUNE, 1920		PERCENT OF PUPILS RECEIVING EACH RATING, FOUR SEMESTERS, 1918-1920	PERCENT OF NORMAL PUPILS RECEIVING EACH RATING
	NUMBER	PERCENT		
Honor	49	24.5	27	10
A	94	47.0	46	30
B	42	21.0	22	30
C	15	7.5	5	30
Total	200	100.0	100	100

There were only 26 cases of failure by these pupils during the four semesters, or 4 percent for a semester. Regular progress was made by 163, and accelerated progress by 11. During the year 1920-1921 there have been practically no instances of failure among these pupils for a semester and their work still maintains its high standard.

In each case of early promotion the parents were consulted and the physical condition of the child was given careful consideration. Then a six-weeks trial was given in the first grade. If the child was able to make normal progress without evidence of physical stress, he was allowed to remain. A very few children were returned to the kindergarten for another half-year. This never occasioned unpleasantness, as care had been taken to secure the cooperation of parents.

The future may bring to light other factors which ought to be taken into account in the grading and promoting of school children, but the writer is confident that the use of intelligence tests is decidedly a step in the right direction.

## PROVISIONS FOR INDIVIDUAL DIFFERENCES IN HIGH-SCHOOL ORGANIZATION AND ADMINISTRATION

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The data used in this paper were obtained some months ago from a questionnaire addressed to four hundred and twenty-five high schools in all parts of the United States. Replies were received from two hundred and twenty-one of these schools, and their average enrollment was approximately one thousand students each. The following brief summary is based on the information received from these schools. The figures show the number of schools to which each item applies and the percent which this number is of the total number of schools reporting on the item in question.

	NUMBER OF SCHOOLS	PERCENT OF SCHOOLS
1. Effort made to group students according to inferior, medium, and superior capacities.....	53	23.9
2. Partial provisions for such classification..	31	14.0
3. No effort made for such classification....	137	62.1
4. Psychological tests used in classification of students according to inferior, medium, and superior capacities.....	15	6.7
5. Psychological tests used partially for such classification of students.....	5	2.2
6. No psychological tests used in classification.....	197	91.1
7. Variation of scope of work for these different groups.....	32	14.4
8. Special method or device for causing the superior student to work up to his full capacity.....	39	17.6
9. No special method or device for causing the superior student to work up to his full capacity.....	182	82.4
10. Having supervised study as part of regular class period.....	70	31.6
11. Having supervised study in few classes only.....	21	9.5

	NUMBER OF SCHOOLS	PERCENT OF SCHOOLS
12. Not having supervised study.....	130	58.8
13. Having one hour or more in class period for recitation and supervised study.....	63	77.7
14. Having less than one hour in class period for recitation and supervised study....	18	22.3
15. Having half or more than half of period given to supervised study.....	51	64.2
16. Having less than half of class period given to supervised study.....	30	35.8
17. Time arbitrarily divided between recitation and supervised study.....	36	44.4
18. Time not arbitrarily divided between recitation and supervised study.....	45	55.6
19. Inferior student most benefitted by supervised study.....	55	67.9
20. Inferior <i>and medium</i> student most benefitted by supervised study.....	18	22.2
21. Superior student most benefitted by supervised study.....	3	3.7
22. No judgment as to who receives the most benefit from supervised study.....	5	6.1
23. Superior student receiving no special attention as long as he is meeting the general requirements of the subject....	174	78.7 -
24. Superior student receiving special attention.....	47	21.3
25. Extra scope of work for the superior student.....	93	42.8
26. No extra scope of work for the superior student.....	128	57.2 -
27. Having honor organizations for students of superior attainments.....	55	24.8 -
28. Not having honor organizations for students of superior attainments.....	166	75.2
29. Having other ways in which the student of superior capacities receives social recognition for high attainments.....	146	61.5
30. Not having other ways in which the student of superior attainments receives social recognition.....	75	38.5
31. Having a system of varying credits according to individual achievement....	23	10.4
32. Not having a system of varying credits according to individual achievement...	198	89.6

	NUMBER OF SCHOOLS	PERCENT OF SCHOOLS
33. Quality alone the determining factor for varying credit in such systems.....	10	43.4
34. Consideration of other factors in determining credit in such systems.....	13	56.9
35. Having a curve of distribution of grades to be followed approximately (all schools considered).....	35	15.8
36. Not having a curve of distribution of grades to be followed approximately..	186	84.2
37. Able to report approximately how large a percent of students receive the different grades.....	70	31.6
38. Not able to say approximately how large a percent of students receive each grade	151	68.4
39. Systematic effort made in checking the grading of teachers.....	105	47.5
40. No systematic effort made in checking the grading of teachers.....	116	52.5

Perhaps a somewhat fuller analysis of the disclosures of this investigation will be of interest. While a considerable number of high schools are making a systematic effort in the classification of students on the basis of capacities, a considerably larger number have not yet attempted this sort of classification. The meager extent to which mental testing is employed in this connection is noticeable. Less than 7 percent of the schools report the regular use of mental tests for this purpose. The more frequently mentioned basis for classification is the student's previous record and his ability to do trial work in a superior section.

But many principals are of the opinion that classification of high-school students according to abilities is undesirable. A New York principal writes: "We have at various times grouped students according to inferior, medium, and superior capacities. This grouping had the result of giving one teacher a class with which she could obtain most excellent results and another teacher a class in which the results were, of course, inferior. After reasonable trial the plan was abandoned." Another principal is of the opinion that "classification according to capacities is undemocratic in that it gives unwise encouragement to an intellectual aristocracy." The great majority of principals, however, have expressed no objection to such classifications.

The practice of extending the scope of work in the sections composed of superior students is not at all prevalent. Of the 84 schools reporting inferior, medium, and superior sections only 32 lay any claim to consciously varying the scope of work for the different groups. A very much smaller number have special methods or devices for causing superior students to work up to their full capacity. In fact, only about 18 percent of the 221 high schools reporting indicate any special method for this purpose. Occasionally we find a high school in which the superior sections move as rapidly as they are able, sometimes completing the work of a given year subject in a half-year's time or a three-year subject in two years. A more novel method is reported by at least two high schools located on opposite sides of the continent according to which the bright students are excused for a day or two at a time in order to permit the dull students to catch up with the educational procession. But the more common method of caring for the superior student is to allow him to carry one or more extra subjects. It will be noted that nearly 80 percent of the schools give no special attention to the superior student so long as he is meeting the general requirements of the course.

In 61.5 percent of the schools, however, some type of provision is made for giving social recognition to superior students of exceptional achievement. The following is a partial list of the more frequently mentioned types of social recognition: (1) assembly programs in which students of highest scholarship participate; (2) honor lists announced at regular intervals in the city and school papers; (3) eligibility to class and student-body positions; (4) honor banquet for students who stand high in scholarship, oratory, athletics, punctuality, regularity of attendance, etc.; (5) eligibility to participation in class plays, interscholastic debates, etc.; (6) special consideration in all appointments to positions of responsibility in student self-government; (7) departmental clubs composed of students of unusual attainments; (8) commencement program speakers selected from high honor list; (9) special announcement at commencement time of special honor graduates; (10) scholarship pennant for the class having highest standing; (11) awarding of scholarship pins, departmental medals, etc.; (12) a large graph in the assembly room showing month by month the ~~relative~~ standings of the four high-school classes; (13) a medal each year to the "best all round" student.

in scholarship, social leadership, and physical ability; (14) graduation "with credit," "with high credit," and "with highest credit" according to individual achievement; (15) diploma indicating specifically what the student has accomplished.

Honor organizations are not as frequently mentioned as are the other forms of social recognition. Some principals feel that such organizations create a caste which is undesirable. "Intellectual reputation," one says, "is sufficient distinction for superior accomplishment. This will take care of itself without artificial encouragement." Another says, "We provide no special social recognition. A democracy should be free from caste whether based on mental ability or any other consideration." Nearly 25 percent of the high schools, however, do have honor organizations. The most unusual type of such organization is reported by the Los Angeles high schools. This is the Ephebian Society of the city to which one person for every forty graduating from high school is elected. The basis of election is scholarship, character, and leadership. Strictly speaking, however, this is not a high-school honor society.

Supervised study as a method of caring for individual differences is in full operation in nearly 32 percent of the high schools reporting. In 9.5 percent of the other schools supervised study has been adopted only in part. It will be noted that nearly 78 percent of the schools having supervised study give an hour or more to the combined recitation and supervised study period. The medium length of class period in all of these schools is sixty-three minutes. The medium length of supervised study period is thirty minutes. Table I is significant.

There is also variety of practice with respect to the freedom which teachers have in dividing the class period according to their own judgment. In 44.4 percent of the schools reporting supervised study, the class period is divided arbitrarily. The rest of these schools leave the matter to the judgment of the teachers. Many principals are of the opinion that the only safe method is to divide the class period arbitrarily; otherwise there will be a few teachers in every school who will use up the period for recitation and thereby rob the students of their rightful time for study. In at least four high schools where supervised study is reported as having failed, the misuse of the time by teachers is given as the chief cause. In only two schools did the principals

TABLE I. TIME GIVEN IN EIGHTY-ONE HIGH SCHOOLS TO RECITATION AND TO SUPERVISED STUDY IN EACH REGULAR CLASS PERIOD

	AMOUNT OF TIME IN MINUTES																	
	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85-89	90-94	95-100	
Number of schools having periods as indicated.....							1	7	3	7	24	10	4	5	7	0	12	1
Number of schools giving time to supervised study as indicated.....	4	15	14	17	10	8	11	2										

report a tendency of teachers to use too much of the period for study. Several, however, remarked that the greatest difficulty in the matter of supervised study is to educate the teachers to a method which must necessarily be different from that ordinarily employed.

In answer to the question as to who is most benefited by supervised study, the inferior, the medium, or the superior student, the answers are indeed significant. The principals of 67.9 percent of the schools where supervised study is in operation say unqualifiedly that the inferior student profits most; 22.2 percent say the inferior *and the medium*; only 3.7 percent say the superior student; and 6.1 percent of the principals have no judgment in the matter. This is in agreement with the statements coming from 78.7 percent of all schools reporting that the superior student receives no special attention as long as he is meeting the general requirements of a subject or course.

Only 10.4 percent of the high schools<sup>1</sup> answering the questionnaire report systems for varying the amount of credit according to individual achievement.

<sup>1</sup> List of high schools having "weighted credit" systems: Eugene (Ore.) Emporia, (Kan.); Atchison (Kan.); Kansas City (Kan.); University of Chicago High School; Decatur (Ill.); Danville (Ill.); Rockford (Ill.); J. Sterling Morton High School at Cicero (Ill.); Richmond (Ind.); Washington High School at East Chicago (Ind.); Greeley (Colo.); Cripple Creek (Colo.); Peabody High School Pittsburg (Pa.); Johns-

In any system of grading the distribution of marks is important but it is doubly important in a system where these marks are more than mere ornaments on paper, where they actually mean excess or diminished credit. It is interesting to note that of all the high schools reporting, there are only 15.8 percent which have a curve of distribution of grades to be followed approximately. Only 31.6 percent of the high schools are even able to say approximately how their grades are distributed. Table II shows the varying practice among schools in the distribution of ratings.

TABLE II. THE EXTENT TO WHICH SEVENTY HIGH SCHOOLS GIVE  
THEIR HIGHEST, MEDIUM, AND LOWEST GRADES  
RESPECTIVELY

	PERCENTS															
	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-65	66-70	71-75	76-80
Highest Grade.....	14	31	9	8	3	1	3	0	0	1						
Medium Grade.....		2	1	2	8	12	11	18	4	7	0	3	0	1	0	1
Lowest Grade.....	24	29	13	2	2											

Table II reads: highest grades constituted 1-5 percent of the grades conferred in 14 of the high schools, 6-10 percent in 31 schools, etc. However, among those high schools which have systems of weighted credit, a much larger proportion report definite information concerning their distributions of grades and credits. The curves of distribution for most of these approximate a symmetrical form. Omitting one of these schools, the average distribution of grades is as follows: highest grade, 8.8 percent; super-medium grade, 21.6 percent; medium grade, 33.3 percent; sub-medium grade, 27.8 percent; and lowest grade, 8.4 percent.

town (Pa.); Parkersburg (W. Va.); Lincoln School, Teachers' College, Columbia University; Flathead County at Kalispell (Mont.); Plainfield (N. J.); Central at Muskogee, (Okla.); Central High School at Tulsa (Okla.); Sioux City (Ia.); Lincoln (Neb.); Analay Union High School at Sebastopol (Cal.); Claremont Junior-Senior High-School, (Cal.)

## CONCLUSIONS

The results of this questionnaire would easily lead one to conclude that in the great majority of high schools the administrative problems of providing for individual differences are far from an adequate solution. It is encouraging, however, to know that a considerable number of high-school administrators are awakening to the importance of these problems and that they are making some headway in the conservation and development of the varying capacities of students. But only the beginning has been made. The writer ventures the following statements relative to his reaction to the situation:

1. The grouping of students according to inferior, medium, and superior capacities may or may not be desirable as a general administrative measure in providing for individual differences of students. It is certainly true that the smaller high school cannot easily compete with the larger schools in providing a number of sections for each class. The extra expense of such a measure would make it prohibitive. But in the larger systems where many sections of a given class are maintained in any case, grouping according to capacities can easily be accomplished without additional expense.

2. If the grouping of students according to capacities is desirable, then a much wider use of mental testing should be employed. In fact, under any system of providing for individual differences, a mental survey of the high-school population is of very great value. Dr. Proctor<sup>2</sup> says, "With this information (mental test scores) at hand the high-school principal can plan the curriculums of his pupils more intelligently. Discovering at the outset that from 15 to 30 percent of his pupils are incapable of succeeding in the conventional high-school subjects, he will undertake to make new adjustments to meet the situation. There will be fewer failures; more pupils will remain to take work that is adapted to their needs and capacities; and the high school will be less open to the charge of catering to the intellectual aristocracy among its pupils." In discussing the problems of individual

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<sup>2</sup>Proctor, W. M. "Psychological tests as a means of measuring the probable school success of high-school students" *Journal of Educational Research*, 1:258-70, April, 1920.

differences met in the first year of the high school, Dr. Terman<sup>8</sup> says, "For purposes of educational guidance it will be necessary to establish the lower limits of intellectuality necessary for success in the various high-school subjects." There are a great many other ways in which a knowledge of the mental levels of the high-school population will be of service in providing for the individual differences of students.

3. Supervised study as usually conducted is only partially satisfactory as a method of providing for individual differences. Too frequently, as may be seen from the results of this investigation, it is planned primarily for the needs of the backward student. The medium student profits little and the superior student least of all. In fact, many are of the opinion that the superior student is really hindered by the ordinary type of supervised study. If supervised study is to succeed as a method of providing for individual differences, it must be adjusted to the needs and interests of students of all degrees of ability. We owe at least as much to the student of superior ability as to the student of inferior ability. We should neglect neither.

4. Supervised study is in danger of failing when the use of the class period is left entirely to the judgment of the individual teacher. There is a strong tendency among a few teachers in almost every school to consume too much of the time in the old type of recitation and thereby rob the students of their legitimate time for study. The administrator must place enough safeguards on the system to insure the proper use of the class period. Sometimes it may be necessary to divide the time arbitrarily. When teachers are properly educated as to the real meaning of supervised study the success of the plan will be made more certain.

5. In the opinion of the writer, a system of varying the amount of credit according to individual achievement is very essential in any effective plan for individual differences. Such a system is in accordance with the prevailing practices of the social and industrial world where, other things being equal, rewards and honors are in proportion to individual achievement. Human nature is everywhere pretty much the same. We are not likely to put forth superior effort when mediocre effort will accomplish the desired ends. When extra effort and achievement are recognized

<sup>8</sup> Terman, Lewis M. *The intelligence of school children*. New York: Houghton Mifflin Co., 1919, pp. 75-91.

and rewarded in the high school, we shall find a much larger number of students working up to their full capacities.

6. A proper recognition of the varying capacities of students logically implies a variable quantity of work in any given subject. Weighted requirements should go hand in hand with weighted credit. In fact, a weighted credit system is incomplete if it does not take into account the ability of the superior student to do a *wider scope* and an *extraordinary kind* of work. More than mere excellence in meeting the general requirements of a subject must be expected and required if the superior student is to receive justice. Working up to one's capacity is the type of thing in education that counts. The inferior student and the medium student usually have the opportunity of doing this. The superior student, on the other hand, is too frequently trained to be a loafer and a mischief maker. On very much less than maximum effort, he can usually accomplish the general requirements of a course in an excellent manner. His original capacity for initiative, independence, and originality are not properly encouraged and directed.

7. Greater attention should be given to the matter of grade distribution. A "normal curve" should, in most cases, be approximated. The curve, however, may take on different forms in different high schools. In a school, for example, which draws the majority of its students from a community of uncultured homes where the parents are engaged in types of unskilled occupations which usually attract laborers of low I. Q's, we should expect the curve to be skewed toward the lower part of the scale. But, perhaps in another school of the same city, where the majority of the students are drawn from cultured homes of the professional classes, we should logically expect to find the curve of distribution skewed considerably toward the upper part of the scale. Still other factors may account for a variation from the so-called "normal curve" of distribution. In any case, the distribution of mental test scores will serve perhaps more than any other type of information as a key to the situation. It is the business of the administrator and supervisors to know the specific causes of variation in order not only to provide for the individual differences of students but to be of real assistance to teachers. An evaluation of the work of the teacher in providing for individual differences is impossible unless the administrator knows what type of material the high school is working with.

## Editorials

### EDUCATIONAL STATESMANSHIP

Education, as it is viewed by most thinkers in the field, has become a factor of primary dynamic force in the moulding of human institutions. Those who still prefer to regard it as mainly a matter of individual culture are a negligible minority. The largest outstanding problem in the field is concerned with the ways in which the concrete manifestations of this underlying principle will evolve. Such concrete manifestations must come through the development of educational statesmanship. We have administrators of local school systems and of individual institutions; we have students of technical educational problems; we have practicing teachers of many sorts; and we have educational politicians in the common and narrower acceptance of that term. But we have singularly failed to develop that type of leadership which sees education in all its manifold operations as a major force in society, interprets to the people their educational aspirations, leads, guides, and inspires.

The reason is plain. This country, which furnishes probably the best field for such leadership—perhaps the only immediately fertile field in the world today—has never provided a stage upon which educational statesmanship can develop to dimensions of impressive proportions. Our one great stage is that of the national theatre. It is there that we have developed great foreign secretaries, great finance ministers, great ministers of commerce and agriculture and internal affairs. Education has no spokesman at Washington, no place in the councils of the nation. Washington is chronically unaware of education as a national force. And whatever theorists and sentimentalists and parochialists may imagine, education is indeed a force which affects primarily our national life. Continued neglect of this obvious fact may very well bring it to pass that the nation will one day wake

up to find that this beneficent creature of its best aspirations has through neglect become a Frankenstein.

H. C. MORRISON.

#### A COURSE IN CHILD ACCOUNTING

We are greatly interested in the recent announcement of a college of education in one of our great universities that Child Accounting has been made a required course for all seniors in the college. We feel that it is a most hopeful sign when it is recognized that teachers as well as administrators need to be well informed concerning the importance of the various topics which will naturally be treated in such a course.

Teachers have recorded sufficient data concerning the children in their rooms, and have filled out a sufficient number of monthly, term, or semester reports to have made us wise indeed on many topics—topics, however, about which in reality we know little because we have failed to use wisely the material which the teachers have thus collected.

It has long been our contention that teachers should not be required to make reports to the administration with which the administration does nothing except clutter up the files. Everything the teacher does should result, directly or indirectly, in the furtherance of the purpose of the school, namely, the education of the community. Records and reports will do this only if such use is made of them as to modify practice through internal adjustment or external stimulation. We greatly doubt if any large proportion of the reports which teachers have made out in most of our schools has functioned in either of these directions.

What effect will a course in child accounting have upon the prospective teachers who take it? We believe that at least two effects may be expected. The first effect should be to make clear to them the whole purpose of the collection of such information and its potential value to a school system when it is rightly used for school improvement. Such a course should give teachers a different attitude toward the labor of making out reports by

showing them the value of the reports. It will not only decrease the friction which requests for such reports now frequently cause, but it will also increase the accuracy of the reports and thus add to their usefulness.

The second effect may be even more important. We wonder if a teachers' course in child accounting may not lead school administrators to make greater use of child accountancy information. Teachers who have already learned to appreciate the value of such information will scarcely permit the administration to collect it at the expense of valuable time and then let it die in the office without benefiting the schools.

We are not anxious to foster rebellion or revolution. But we hail the day when a course, such as we are referring to, will be so truly the experience of new teachers that every school system will reap the benefit of extensive child accounting because the administration will recognize either voluntarily or involuntarily the necessity of such accounting.

E. J. A.

#### SCHOOLS OF TODAY AND YESTERDAY

We lately received a letter from an esteemed correspondent who bemoaned the decadence of the modern school. Fine buildings he saw, but the gifted teachers of other days were no more. Moreover, the product of the efforts of present-day instruction he regarded as lamentable. It was his particular complaint that children were no longer strong in English grammar. Accordingly, he had written a textbook which he had published privately and which he had plentifully equipped with rules of syntax and passages for parsing.

This estimable gentleman's plaint would be no more than amusing if he did not in fact represent a type. Many men and women are, like him, honestly of the opinion that the public schools of today are inferior to those of a generation or two ago. They tell us of the sturdy self-reliance of the pupils of those earlier days, of their ability in arithmetic, of their strength

in English grammar, and of their prowess in spelling. Thus it comes about that many a superintendent is thwarted in his efforts to obtain public assent to needed betterments because of the roseate recollections of one or two "key" men in the community or on the board of education.

Yet it is certain that these recollections are partly false, partly incomplete, and wholly unconvincing. The fact is that during the lifetime of men not yet old enough to have lost their influence on election day, the public school has entirely changed, not only in size and expenditures—which is obvious—but also in its purposes and the success with which it attains them. It is attempting far more than it used to attempt; it is playing a far greater part in the life of the community. Its value cannot be judged in terms of spelling and arithmetic. It is a social force second to none, and it is as such that it must be judged.

In days gone by education was a privilege, and was afforded to such families as chose to send their children to school. To-day education is compulsory, and the school must offer training to "all the children of all the people." This is decidedly a different matter. It means that the earlier schools were concerned with a selected group of pupils—namely those coming from families where "schooling" was appreciated. Dull children, to say nothing of the feeble-minded, seldom appeared. When, however, all children were swept into school by legislative enactment, conditions changed. Classes were diluted with human material incapable of profiting by the course of study hitherto offered.

Yet this human material had to be trained. Accordingly, the course of study was revised. When obstructionists compare the schools of today with those of yesterday they do so with reference to the only things which the older schools did, without remembering that the newer schools not only do the same things but that they do many others. We never hear much about the achievements of the earlier schools in geography, or history, or science. Something in these lines was attempted, but it was not allowed to interfere greatly with the sterner business of spelling

and arithmetic. As the school took over the training of all children up to the age of at least fourteen, some of the subjects hitherto regarded as of secondary importance began to be emphasized. Moreover, entirely new subjects began to appear—and they appeared because of the evident needs of types of children who in the days of voluntary attendance stayed away from school.

Yet in spite of the present diminished emphasis on the subjects which once constituted the core of instruction, and in spite of the fact that these as well as all the newer subjects are now taught to a far greater proportion of pupils of moderate intellectual endowment than was formerly the case, it is nevertheless a fact that results in the older subjects (*e. g.*, in spelling and arithmetic) are better today than they ever were. Old examination papers and records of answers have been found in attics, and in other out-of-the-way places. When these questions have been given to pupils now in school, they have decisively beaten their more highly selected competitors of earlier days. Of course, in examining the children of today, questions on such subjects as cube root, true discount, and allegation were omitted.

The plain fact is that the school of today has risen to new heights and that the teachers of today have become highly specialized. It is because teaching as now practiced in progressive communities is the occupation of a body of highly trained professional workers that pupils less highly endowed than formerly may be taught more subjects and may be taught them more effectively. While the obstructionist business man or board member has been growing old, the scene has shifted. Of course, he recognizes that it has done so in methods of communication, in the applications of electrical energy, and in farm machinery. But he fails to notice that it has done so no less certainly in the schools. The pupil who enters the first grade today does not spend the whole year learning the alphabet—and making a bad job of it as used to be the case. He begins at once to learn to read, and he picks up the alphabet almost unconsciously by the middle of the year. Discipline in the class room is today a fine

art. "Lickin' and larnin'" have broken their unsavory partnership. The teacher, no longer able to resort to corporal punishment, secures better discipline by methods which call for greater resourcefulness. Supervision has split off from teaching by a process of specialization, just as supervision has developed to a high degree in the industries. In short, it is submitted that the schools of today are doing a work which the schools of yesterday never even envisaged.

B. R. B.

## Reviews and Abstracts

MAXWELL, C. R. *The selection of textbooks.* (Riverside Educational Monographs) Boston: Houghton Mifflin Company, 1921. 139 pp.

The author begins with the statement "the textbook is an accepted tool in teaching" and emphasizes the purposes served by the textbook in our schools today. He then asserts that the problem of selecting textbooks has brought much criticism upon school officials and discusses what he terms "basic considerations" which have been used in the selection of texts. Among these basic considerations are: prestige of the author, prestige of the publisher, general appearance of the book, its wide use as a text, and the cost of the book. While the author allows some weight to most of these items in his special outlines for evaluating texts, he says they should receive minor consideration. He then relates that three different agencies are responsible for the selection of textbooks,—the school board, the superintendent alone, and the superintendent in connection with a committee of teachers. He argues that adoption by the last mentioned agency is most desired. In the section on "Methods and Term of Adoption" he says that the unit of adoption should be co-terminous with the supervisory unit and that the adoption should extend over a long period of years. In his chapter on "Free Textbooks versus Individual Ownership" he presents the stock arguments on each phase of the question and says that "one's attitude on the question will depend largely upon his philosophy of the State." He adds, "we need not be surprised to have the next generation feel that the public is just as responsible for furnishing free textbooks as it is for furnishing buildings in which instruction is given."

In the last three chapters of the book, the author sets forth his idea of the standards which should be applied in the selection of textbooks. He first sets forth his standards in the form of discussion and then presents them in

a general outline or score card to be used in judging all texts and specific score cards for evaluating texts in reading, arithmetic, language, spelling, geography, history, civics, drawing, penmanship, algebra, geometry, science, and foreign language. To one interested in the scientific selection of textbooks, the announcement of such a list of score cards is especially gratifying; but imagine his disappointment when he finds that few of the criteria mentioned have been scientifically determined. Each item of the score card is checked under the caption of excellent, good, fair, or poor. The amount of weight to be assigned to the various items is left to the option of the user. The author feels that the function of the outlines is merely "to raise the pertinent questions that should receive attention when one examines the texts." He says plainly that no suggestions are offered as to relative values, and leaves one with the impression that this is of little significance. Such quotations as the one following concerning the evaluation of subject matter sets forth this impression: "this (evaluation) would be of little worth, for one person may think a particular phase of subject matter important while an equally good authority may consider this same phase unimportant."

From the standpoint of the reviewer this lack of formation of definite standards for judging the value of textbooks constitutes a weakness of the book. It will probably have an extensive sale because of the attractiveness of its title, but it seems doubtful if it will have much influence in bringing about a better selection of books.

CLIFFORD WOODY

*University of Michigan*

FINNEY, Ross L. *The American public school.* (The Modern Teacher's Series.) New York: The Macmillan Company, 1921. 335 pp.

Under a skillful disguise, the reader finds a treatise on the history of education, but not as "traditionally organized and presented." It is rather as indicated in the sub-title, "A genetic study of principles, practices, and present problems," that the author presents the problems of today with such phases of history, educational, political, and economic as are relevant as a background. It is not until one is well into the book, however, that he realizes fully that the presentation is from the present day standpoint.

The book opens with our colonial period, showing the beginnings of our educational system. Following this comes a review of the lives and achievements of Rousseau, of Pestalozzi, of Herbart, and of Froebel and of the bearing which their lives had upon American education. This leads naturally into the period preceding our Civil War when Horace Mann rendered his great service. The transition period from the Civil War to 1890 deals largely with the changes, educational, political, and economic, growing out of the war and particularly with the work of such men as E. A. Sheldon and Colonel Parker. About one-third of the entire book is then devoted to the period since 1890, in which appears a discussion of "Educational Reorganization" and "Enriching the Curriculum." In closing, about twenty-five pages are used to set forth "The Present Outlook." In brief, approximately one-third of the book is given to educational history, American and European, as a fundamental intro-

duction to the American School, one-third to the intermediate period of awaking and transition to present practice, and one-third to present day tendencies and practices.

Since at the present time the place of the history of education in the training of teachers by our normal schools is so much in question, this presentation is very valuable. As the editor states in his introduction, the young teacher "must have some notion of the structure and purpose of the organization of which he will form a part" in order that "his own practice may be intelligent" and that he may "participate intelligently with his fellow workers." Mr. Finney accomplished this very definitely by setting forth the relation between present practices and the fundamental underlying structure.

There comes a slight disappointment, however, in the final chapter which deals with the present outlook. The author has previously emphasized the value of the study of history in order to forecast the future. It is a notable fact that our historians who undoubtedly had "a bird's-eye view of the race's past back into remote prehistoric time," failed to anticipate the recent world war. Consequently, when he states early in his treatise that "one reason why teachers should study the history of education is, that they, at least, may be able to see clearly what the present tendencies in educational development are really pointing toward," the reader is somewhat disappointed to find in the final chapter under the captions "The new super-civilization" and "The new schools of the age: curriculum" only general ideals which have been before the world for centuries. The forecasting of solutions for present day problems in education lacks the vitality which characterizes the earlier portions of the book.

Altogether the book should be both profitable and delightful to the young teacher who has not studied deeply into the fields of history of education or of principles and present day practices. The author has introduced much personal comment throughout in a manner that illuminates the purely historical matter. Through this there runs an element of humor that enlivens and makes interesting what might otherwise be burdensome reading for a young teacher.

C. C. McCracken

*Ohio State University.*

WELLS, MARGARET ELIZABETH. *A Project Curriculum.* (School Project Series)  
Philadelphia: J. B. Lippincott Company, 1921. 338 pp.

In this volume Miss Wells has worked out in great detail her interpretation and conception of the "project" as a factor in educational progress. There are many diverse applications of this recent addition to the educationists' special vocabulary, ranging from a mere re-naming of certain types of classroom procedure to so inclusive an interpretation as that offered by Miss Wells. She conceives the elementary curriculum as a series of major projects, each one a vehicle for a whole year's work. This plan was evolved and put into operation in Trenton, New Jersey. Section I of the book contains a detailed description of the activities pursued in the first three grades under the author's supervision. The first grade "major project" was "playing families"; the second

grade, "playing store," and the third grade, "playing cities." The work of each whole year was a dramatization of the respective activities. The theses underlying the proposed "curriculum" are stated in Section II of the book. Quotations from the writings of leaders in educational philosophy and psychology are built into a defensive interpretation of the "proof text" variety. The use of these "texts" in the argument, leads one to wonder whether the authors most liberally quoted would agree with Miss Wells' proposal *in toto* as valid curriculum reconstruction.

There is an untoward positiveness on the part of the author, which leads one to wonder whether she was sufficiently critical of her own thinking and whether certain sweeping assertions do not need the softening effect of qualifying reservations. The statement of "facts taught" under "The Outcomes of the Curriculum" would be more convincing if the reader could ascertain from the records to what extent the "facts" were *learned* as well as *taught*.

Similarly, under "skills," there is a profound lack of evidence in a field where quantitative evidence is easily gathered.

The activities, no doubt, gave numerous opportunities for the formation of habits but there is a paucity of data upon which critical evaluation can proceed. One seeks in vain for any record of the reactions of individuals, or descriptive case-studies from which growth in attitudes could be deduced.

The appendix contains a few sample lessons and some of the written materials of pupil groups and individuals; the illustrations show the end results of construction and the final pageant in which three grades participated.

Similar and additional values do not, of necessity, depend upon the acceptance of Miss Wells' curriculum. There are those who deem radical innovations a necessary part of educational progress. They must, then, be doubly critical of their proposals so that these cannot be attacked on *a priori* grounds; otherwise, they will not carry us as far forward as they depart from the traditional path. Advance by such means gives a maximum of movement with a minimum of progress. The zig-zag course obscures the goal and confuses those who are eager for new trails. A wide use of the "curriculum," as proposed, would be premature at this time. Its statement and publication will facilitate experimental evaluations, and, by a careful sifting of values, the real contribution will be revealed.

LAURA ZIRBES

*The Lincoln School of Teachers College*

STRAYER, G. D., and ENGELHARDT, N. L. *The classroom teacher at work in American schools*. New York: The American Book Company, 1920. 400 pp.

This book consists of sixteen chapters covering a great variety of topics which deal with the organization of public education, supervision of instruction, types of teaching, training for citizenship, teaching children to study, the daily program, children's health, educational measurements, and similar subjects. In fact, the number of topics covered is so large that almost every field in the professional side of education is touched, in one way or another.

The writer of this review is very doubtful about the value of a book of

this kind for teachers. Necessarily, on account of the variety of subjects covered, the treatment of each is very brief and sketchy. Teachers who have little familiarity with education will not find the book of great value, on account of the brevity with which each topic is treated. Students of education who are already, to a degree, familiar with the literature of the subject will also fail to profit greatly from the treatment of the various topics considered in the book. For example, the whole subject of measuring the achievements of children is disposed of in a little more than forty pages, seven of which are devoted to a list of standard tests. The subject of teaching children to study is covered in about ten pages. The chapter on types of teaching considers such topics as the drill lesson, the place of review, memorization, appreciation, how to stimulate thinking, the place of the problem, thinking and reasoning contrasted, induction and deduction, the open-minded attitude. There is nothing especially new in this material and the treatment of none of these topics is at all adequate.

The writer of this review seriously doubts the value of books of this kind which contain merely conventional material treated in the briefest possible space. Such books contribute little or nothing in the way of new knowledge, but merely restate, in formal language, familiar material on a great variety of topics.

H. A. BROWN

*State Normal School, Oshkosh, Wisconsin*

## News Items and Communications

This department will contain news items regarding research workers and their activities. It will also serve as a clearing house for more formal communications on similar topics, preferably of not more than five hundred words. These communications will be printed over the signatures of the authors. Address all correspondence concerning this department to Doctor E. J. Ashbaugh, Ohio State University, Columbus, Ohio.

**Bureau at North Dakota** The University of North Dakota has recently established a bureau of educational measurements with F. M. Garver as head. There is a faculty committee known as a committee on research which is designed to assist the director in coordinating the work within and without the University.

**Program of College Teachers of Education** The Society of College Teachers of Education will hold three sessions at the Chicago meeting of the Department of Superintendence on Monday, Tuesday, and Wednesday afternoons, February 27, 28, and March 1. The first session will be devoted to a résumé of developments and critical discussions of the present status of various movements, concerning which teachers of education ought to be informed. The second session will be devoted to college

departments of education. The third session will deal with certain phases of organization of college departments of education.

**Interest in Visual Education** A number of communications have come to our notice—communications from people who are interested in finding out the value of visual presentation for educational purposes. This subject has been somewhat forced upon the attention of school people by the logic of advertising. The result is that investigation is afoot to find out the relative advantage of slides, reels, and pictures both for ordinary and stereoscopic use.

An effort is being made to compare the relative effectiveness of these means of presentation and also to compare them with non-visual presentation. Just at present the trend seems to be against the motion picture as an effective means of teaching.

**H. S. Graduates and College Entrance** Reports from two hundred fifteen Oregon High Schools to State Superintendent J. A. Churchill show that out of 3335 graduates in the class of 1921, thirty-nine percent are this year attending institutions of higher learning. Since many students must first earn the money to maintain themselves in college, it is safe to predict that within five years the total college registration of last year's class of high-school graduates will amount to forty-five percent.

A larger proportion of boys than girls have registered this year in college. Out of 1290 boys, 571 or 44 percent are reported as having entered an institution of higher learning; while of 2045 girls, 727 or 35 percent have gone to college.

The reports from the high schools also disclose the interesting fact that out of the 1298 graduates of last year's class now attending college only 136 are registered in institutions outside of Oregon.

**Measuring Normal School Libraries** The committee on normal school libraries of the N. E. A. has just issued a first statement on standards for normal school and teachers college libraries.

The statement is issued as a basis for discussion and survey. The statement is in two parts, one for two-year normal schools and the other for four-year teachers colleges. Figures are also given on the basis of an initial enrollment of 300 students and increment for each additional 300.

The items considered with numerous subheads are: building and equipment, library fund, librarian and staff, and library instruction.

Those interested in the examination of this tentative measuring stick in order to check their own libraries and to offer constructive suggestions to the committee, should address the Chairman, Mr. W. H. Kerr, Kellogg Library, Kansas State Normal School, Emporia, Kansas.

**Reviewing  
Tests**

Our more attentive readers—readers like Professor Morton of Ohio University who says he had read our November issue from cover to cover including advertisements—will recall that Dean A. Worcester suggested the advisability of appraising and reviewing new test materials. Interest in this idea seems to grow. We have a recent letter in which the writer suggests that a committee be appointed on which every reasonable bias with respect to tests will be represented, that this committee formulate points on which to judge tests, and that each new test be sent to this committee, with the idea that its judgments will be assembled and published. It is the thought of the proposer of this plan that old tests as well as new ones might be considered. We are already assured that one or two of the most level-headed men engaged in the consideration of tests would be willing to serve on such a committee if it were established. We shall be glad to hear from our readers as to its desirability.

**Rural vs.  
Graded School  
Results**

A great deal of interest is manifest in all parts of the country in the comparison of school room results in rural one-room schools as compared with the graded schools as shown by the use of standardized tests. A report has just reached us of such a study in reading and arithmetic in Howard County, Maryland. The study involved about 500 children in each of the two types of schools. The results show that in rate of reading, there is little if any difference, but in comprehension the graded schools scored higher in all grades. In arithmetic the results in the rural schools were lower in grades three and four but approximately the same in the upper three grades.

Supplementary to the above data was an age-grade distribution which showed almost identical percents of under-age pupils and only about 2 percent greater number of over-age. The results confirm in general the results which have been reported from other parts of the country.

**A Mathematics  
Round Table**

Superintendent H. J. Stockton of Johnstown, Pennsylvania, has sent us a copy of a mimeographed circular which gives a review of his "Mathematics Round Table." He heads the circular "Step-wise Progression of Difficulties in the Four Fundamental Operations." Under each operation he has designated the progressive steps in increasing difficulty and has thus indicated to his teachers the order in which the various steps should be undertaken. In addition to these steps, a general comment is given in terms of accuracy helps and speed helps. In other words, the superintendent and supervisors have built a helpful course of study in the four fundamental operations. Standard achievement on the Courtis tests are set up as the specific goal to be obtained.

If Superintendent Stockton or others have courses of study on single subjects or phases of subjects which meet the fundamental requirements; (a) sequential organization of material on the basis of difficulty; (b) specific goals of attainment in concrete terms; (c) definite helps to the teacher as to

how to attain these goals, we shall be glad to receive them and give publicity to them through these columns.

**Aids in  
Computation**

Correlation is reached in a course in Statistics only toward the end of the term. Its difficulty and the fact that more time is therefore required for it than is available toward the end of the course, makes our instruction in this topic more or less unsatisfactory. Nevertheless, there are many occasions when even in practical as opposed to theoretical inquiries, the correlation method is needed.

Accordingly, we welcome the various devices which have lately been issued to facilitate the computing of correlation coefficients. We have lately received one from Professor L. L. Thurstone of the Carnegie Institute of Technology. The value of such devices seems to be that by means of them, clerks who are relatively untrained in computing and who know practically nothing of the theory of correlation, may be set to work on the derivation of correlation coefficients.

Professor Thurstone's table provides a definite place for each step in the computation. It is thus impossible for a person to forget a step or to leave anything out. Those who are called upon to conduct investigations requiring a large number of computations of this sort are advised to obtain Professor Thurstone's "Correlation Data Sheet."

**Research  
Department Ohio  
Teacher's  
Association**

On December 28, 1921, the Research Department of the Ohio State Teachers Association met at Columbus, Ohio. There were three sessions. In the morning Dr. Willis L. Gard discussed "The influence of kindergarten training on achievement in reading and arithmetic"; Mrs. Margaret S. Brainerd presented data on "Intelligence tests as a basis for classification and promotion"; and Superintendent B. O. Skinner gave a talk on "The relation between the Handschin predetermination language test and success in beginning Latin." At the morning session an address was also made by Dr. William A. McCall of Teachers College on "Tests and school organization."

In the afternoon, Superintendent E. M. Otis gave a paper on "A textbook score card"; Professor Harry N. Irwin spoke on "Success in teaching as related to success in professional training classes"; and Mr. T. Howard Winters discussed "The qualifications and success of Ohio county superintendents." The principal address of the afternoon was given by Dr. Sydney L. Pressey on "The need for a more simple and direct statistical procedure in the work with tests."

The evening session—which was for members only—was devoted to a dinner and to a business meeting.

**Case Method  
in Pedagogy**

Dr. W. P. Burris, Dean of the College for Teachers, University of Cincinnati, is enlisting the cooperation of persons interested in the training of teachers in the collection of samples of good teaching. He calls attention, in a circular letter which we have received, to three methods of studying any subject. They are: (a) the lecture method, (b) the textbook method, and (c) the scientific method.

He states that "In the first, the learner listens to what someone has to say about a subject; in the second, the learner reads what someone has written about a subject; in the third, the learner studies the thing itself."

He believes that the time has come for the application of the scientific method in the study of teaching and that this necessarily involves what has come to be well known in the teaching of law as the "case" method. He recognizes that it will take much time and labor to assemble a collection of excellently taught lessons, but believes that it is possible to secure them, and that in the long run it will economize the time and energies of trainers of teachers and of students in training everywhere.

Anyone interested in the training of teachers and willing to assist in this enterprise should get in touch with Dean Burris.

#### Classes for Gifted Pupils in Summer School

Last summer at St. Paul, Minnesota, 90 of the brightest pupils in grades 7B to 8A, inclusive, completed a semester's work in seven weeks attending school forenoons from 8:30 to 11:30.

In May, teachers in the grades concerned selected those pupils who in their judgment stood in the top fifth of their classes. The names—about 460 in all—were reported to the Division of Research. These pupils met at convenient schools and were given a psychological test, in this case, the Illinois Intelligence Examination and Silent Reading Test. By means of these, it was possible to obtain a reliable measure of the children's mental development and a fair indication of their ability to read and understand written English. About 140 of these pupils, distributed fairly evenly among the four grades, received intelligence quotients of 120 or above. These with a few others who scored lower, but who seemed to make up for this deficiency in other respects, were invited to attend summer school. Ninety-five accepted.

Mainly on account of the severely hot weather during the first weeks, a few pupils dropped out. A somewhat smaller number was absent too many days to complete all subjects, and will have to do some make-up work during the present semester. Seventy-nine passed outright, most of them with unusual records in scholarship. Counting those who are to complete back work by additional study, there are about 90 pupils who will gain half a year as a result of the summer school. This is very encouraging, indeed, and indicates the great value of summer schools, both to the pupils and to the efficiency of the school system. Besides the saving of time and teaching effort, there is the added stimulus to all pupils to make the most of their opportunities.

Attendance during summer school was very regular. The attitude of pupils was remarkable for its seriousness of purpose. This was especially evident in the 8A class for which completion of the work meant permission to enter high school in the fall. In this class all marks in deportment, except one, were A.

One of the teachers writes in her report: "The most natural, happy atmosphere I have ever secured in a schoolroom prevailed. Each selected student was on his mettle anxious to prove himself worthy, as well as to get all he could from the contributions of classmates and from his own efforts.

Being on a more even basis, no one felt obliged to 'talk down' to anyone else and no one was intimidated because others were 'smarter' than he. Doubtful statements did not go unchallenged, yet courtesy was uppermost in every discussion, and errors were gracefully acknowledged. Almost without exception, these children showed practical self-judgment and made themselves interesting by forming their own opinions and acting upon them.'

What were the intelligence quotients of the 460 pupils who were examined and of those who completed the summer course? The average of the entire group of 460 was 114 as compared with a standard of 100. The average of the pupils who attended summer school was 126. However, it was surprising to find that 18 percent of the whole group selected for examination fell below the average of 100 and that one went as low as 68.

O. J. JOHNSON,

*Assistant Director of Research,  
St. Paul (Minn.) Public Schools.*

#### A Latin Experiment

The purpose of the experiment reported in this paper was to try to find a standard with which to measure the power of pupils in translating Caesar's Gallic War, after one and one-half years of study of Latin. An effort was made to choose three fairly typical passages from the text. The passages selected were Book VI, chapter 9, Book VII, chapter 12, and Book VII, chapter 57. The following instructions were prepared for conducting the tests and scoring the results.

1. Each test is to be given as a sight passage to pupils who have completed one and one-half years of Latin. It shall not be given to pupils who have previously read the passage.

2. The test shall occupy exactly forty minutes.

3. The translation shall be a correct translation based on sound syntactical construction. If for any reason the pupil deviates from this and takes liberties with the exact construction, as for example, translating a verb in the active voice by the passive voice, he shall indicate on his paper that he has deliberately made such a change.

4. In scoring, each word correctly translated shall count one point. When an error is made in either the meaning or the construction of a word, thus giving a wrong interpretation to the sentence, the pupil shall be charged only with the failure to translate correctly that particular word. Determine accurately the exact number of Latin words correctly translated. Determine the median for your school for each test.

5. A reasonable amount of variation should be permitted in the rendering of certain words and phrases. For example, in Test I the preposition *in*, line 1, may be translated "into the territory of," "into the country of," "among," or "into"; *quarum*, line 2, either "of these" or "of which"; *altera*, line 2, "the other," "the second," "another." The ablative absolute *huius constitutis rebus*, line 4, may be rendered "when (after) these measures had been decided upon," "having decided upon these measures," or "these measures having been decided upon." The ablative absolute *praesidio relicto*, line 7, may be rendered, "when (after) he had left a garrison," "having left a garrison,"

or "a garrison having been left"; *ne*, line 7, "in order that not," or "lest," though the former is preferable.

Translations were given for the following words: Book VI, chapter 9, *purgandi, laesam (esse), satisfactionem, perquirit*; Book VIII, chapter 12, *obviam, significazione, iuiri*; Book VII, chapter 57, *supplemento, Agedinci, Canulogeno, Aulereo*.

The tests were mailed to all the four-year approved high schools in the state of New Jersey. Twenty-one schools representing more than five hundred second-year Latin pupils participated in the test. The results show that the tests were not of uniform difficulty. The median for test one was seventy-six words, for test two, sixty-four words, and for test three fifty-five words. It is not yet possible therefore to fix a standard score for a "typical" passage from Caesar. Possibly future experimentation will determine ways to select such a typical passage. But we at least know now that, according to the results of more than five hundred test papers distributed over the entire state, pupils of one and one-half years Latin standing, who are tested on the passages mentioned above and whose scores equal those of the above medians may properly receive the rating C.

The following table gives the detailed results for each school involved in the testing. It also gives the range between the best and the poorest pupil

RESULTS OF TESTS GIVEN IN SECOND-YEAR LATIN IN ORDER TO DETERMINE  
STANDARD SCORES

School	TEST I			TEST II			TEST III		
	Range	No. of pupils	Median	Range	No. of pupils	Median	Range	No. of pupils	Median
1	26-137	62	103	25-90	63	67	24-84	54	57
2	40-115	10	65.5	39-79	9	63	39-69	9	56
3	15-110	47	73	0-85	51	65	10-80	52	51.5
4	8-117	22	75	13-77	24	50.5	2-72	23	49
5	18-49	7	32	28-58	7	41	12-34	8	28
6	85-131	23	113	55-85	23	59	53-77	22	65.5
7	45-115	24	82.5	52-82	27	59	48-79	25	68.5
8	27-126	59	77	36-86	59	62	30-78	54	55
9	21-107	11	45	23-62	11	38	18-65	11	38
10	33-103	13	88	31-71	11	50	37-80	13	49
11	55-90	12	77	35-95	15	74	52-84	13	74
12	58-78	2	58	72-74	2	73	53-68	2	60.5
13	45-124	8	103.5	71-87	9	84	52-80	9	74
14	81-121	8	91	53-79	11	64	36-78	11	56
15	100-142	22	127	60-94	25	76	50-84	25	66
16	56-127	26	107	52-82	26	70	38-79	26	65
17	9-131	11	86	53-83	12	64	34-67	10	57
18	42-98	8	79.5	30-68	8	56.5	6-76	8	72.5
19	69-125	6	91	68-81	6	72.5	68-77	5	72
20	21-125	112	85	6-90	117	65	8-80	111	52
21	25-95	15	70	30-53	12	39	38-51	15	42
Total Scores	8-147	508	76	0-95	528	64	2-84	515	55

in each school. The extent of this range as well as the wide variation between the median results of the various schools is very striking. The poorest pupils in some schools do better than the best in other schools. The median in five schools on test one was greater than the best score of any individual student in four other schools. Similar results are seen in the other two tests.

It will be noted that the schools with a small number of pupils are not necessarily those with high median scores. Evidently the individual attention which is possible in such schools, does not function in increasing ability on the part of the students.

One may also raise the question as to whether these wide variations may not persist throughout the entire work of the schools in Latin. If such be the case, then the quantity of work which these various schools are certifying to the colleges is so clearly different that one may well question whether an institution which makes Latin an entrance requirement may not be justified in insisting upon more definite information concerning the work of the student certified.

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WILLIAM A. WETZEL

**The Educational Finance Inquiry Conducted by the American  
Council of Education**

Washington, D. C., November 21, 1921.—The American Council on Education announces the appointment of a commission to conduct a comprehensive investigation of educational finance in the United States. For several years legislators, philanthropists, and the general public have been aware of the increasing difficulty of supporting public schools and universities. Educational officers have come to regard the problem of financing education as the outstanding problem now before them. The paramount importance of the matter was emphasized at the citizens' conference on education called by the United States Commissioner of Education in 1920. This conference passed resolutions urging a thorough investigation of the cost of education and of public resources available to support it. A group of the leaders of the Department of Superintendence of the National Education Association meeting in Atlantic City, February, 1921, likewise designated this problem as the most vital one now confronting school administrators and appointed a committee to assist in launching an investigation if means might be found to carry it on.

The American Council on Education then sought contributions for this purpose. It is now assured of funds sufficient to undertake such an investigation on a scale never before attempted. One hundred and seventy thousand dollars has been raised for the study. The Council has appointed a commission composed of recognized specialists in education, taxation, and business to conduct the inquiry. The commission consists of the following persons:

Samuel P. Capen, Director of the American Council on Education, Washington, D. C., *ex officio*.

Ellwood P. Cubberley, Dean of the School of Education, Stanford University, Stanford University, California.

Edward C. Elliott, Chancellor of the University of Montana, Helena, Montana.

Thomas E. Finegan, State Superintendent of Public Instruction, Harrisburg, Pennsylvania.

Robert M. Haig, Associate Professor of Business Organization in Columbia University, New York City.

Victor Morawetz, Attorney-at-law, New York City.

Henry C. Morrison, formerly State Superintendent of Public Instruction of New Hampshire, Professor of Education, University of Chicago, Illinois.

George D. Strayer, Professor of Educational Administration and Director, Division of Field Studies, Institute of Educational Research, Teachers College, Columbia University, New York City.

Herbert S. Weet, Superintendent of City Schools, Rochester, New York.

Dr. Strayer has been selected as Chairman of the Commission and Director of the work of the Inquiry.

It is generally recognized that during the past decade all kinds of public schools have developed and expanded in an extraordinary manner. The war seemed to stimulate rather than to retard the growth of every grade of instruction given at public expense. What will it cost to support on a uniform basis a system of public education as at present organized? In what way can this undertaking, especially in the rural regions, be reconciled with the other obligations entailed by the conduct of the public's vital concerns? Educational workers and public-spirited citizens throughout the country have agreed that the issue has become one of cold, hard facts.

The primary aims of the Educational Finance Inquiry will be to study in typical states and communities the existing program of public education, the extent to which this program is carried out, and the present and prospective costs involved. It is proposed to investigate the relation of educational expenditures to other necessary governmental expenditures, the methods of raising revenue for the support of education, and the possibility of effecting economies.

#### The Reliability of Judgments Based on the Willing Composition Scale

The minor study reported in this communication developed as a by-product of a survey project in a class in Educational Measurement. The class, consisting of eighteen Junior students in the Teacher's College of the Southern Branch of the University of California, was given the task of making a survey of the University Training School. In the measurement of written composition the Willing Scale was used, the grading being participated in by nearly every member of the class. Inasmuch as these students had had no previous experience in rating compositions by any scale, it was felt that the data secured would throw some light on the reliability of the Willing Scale when used by untrained teachers. The results incline the writer to regard the scale as a very trustworthy instrument for measuring the "story value" of compositions.

Compositions were secured in the usual manner from the pupils in grades four to eight inclusive, a total of one hundred forty-three. The papers were then distributed among the members of the class, each student rating independently ten to thirty papers. This first rating was recorded on the back of

the paper. They were then redistributed and a second rating given, this being usually recorded on the front of the paper. Thus each composition was given two independent ratings by different judges, none of whom had had previous experience in this work.

A study was then made of both the correlation and the divergence of the pairs of ratings. The Pearson coefficient was first calculated, the value of  $r$  being  $+0.884$ , with a probable error of 0.0123. In estimating the divergence, the difference between each pair of judgments in scale units was recorded, together with its frequency. The results are shown in the following table:

Difference	Frequency	Percent of total
0	56	39.15
5	37	25.87
10	32	22.38
15	10	6.99
20	5	3.50
30	2	1.40
45	1	.70

Average divergence, 6.01 scale units, P.E. 5.92.

While the writer has in the past tended to question the likelihood of securing uniform "story value" ratings by this scale, the data secured would seem to indicate that its reliability is surprisingly high. Probably the discrepancy between ratings by practiced judges would be very much less than in the case of untrained students.

MARVIN L. DARSIE

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#### Report of the Wisconsin Publicity Committee

The publicity committee of the Wisconsin Teachers Association has recently published a sixteen-page report entitled "Selling Education to Wisconsin." The committee has been at work for two years and it is evident from the report that a great amount of good has been accomplished. The association defined the committee as "a body whose duty it shall be to educate public sentiment on the imperative and immediate need for larger expenditures for the public schools of Wisconsin with the specific aim of increasing teachers' salaries." The first work of the committee was to conduct a campaign of general education, to interest the public in the work of the schools, and to arouse it to the vital importance of education. Emphasis was placed on the immediate necessity of increasing salaries to prevent further loss from the ranks and to induce new people to enter. This was accomplished and the second year emphasis was placed upon the "indisputable fact that only professional teachers should be hired, and that such teachers can only be secured on terms which will pay a return on their investment of time and money in training."

The committee has apparently accomplished much in these two lines, since there is an unusually increased enrollment in all types of teacher-training

institutions. Four times as many cities have increased their salary schedule this year over last as have lowered it, in spite of the financial depression; and a large number of places have defined qualifications for admission to the teaching force.

The report calls attention to the excessive teacher turnover. This was especially bad in the fall of 1921 due largely, apparently, to the attempt of some communities to lower the salary schedule. Reports from 61 counties showed 72 percent of teacher turnover in the rural schools last fall. Certainly a turnover higher than 20 to 30 percent must be observably detrimental to the schools.

The bulletin calls special attention to the results of the campaign, such as the adoption of resolutions by the Wisconsin Federation of Women's Clubs, and the action of the League of Women Voters in urging local leagues to make a thorough examination of the local school systems; to the activity of all classes of citizens in local campaigns and especially to the publicity which the newspapers have given to the schools. The following table shows salary increases in different types of schools for the past two years.

TYPE OF SCHOOL	INCREASE IN SALARY	
	1920-21 over 1919-20	1921-22 over 1920-21
City Schools .....	37 percent	7 percent
County Training Schools.....	26 " "	6 " "
Schools of Agriculture and Domestic Economy .....	19 " "	6 " "
Vocational Schools .....	26 " "	4 " "
Normal Schools .....	25 " "	13 " "
Universities .....	25 " "	1 " "

An exact statement of the increase for rural schools was not available but for the two years it is estimated that the increase was well over 50 percent. However, 35 percent of the rural salaries are still below one hundred dollars a month as contrasted with one percent of the elementary-grade teachers' salaries in city schools. The following words are a concrete explanation of what everyone, familiar with such types of work knows, "no lasting work is done in a year or two in educating and building up public sentiment. Somebody should carry on; every member should be willing to contribute one day's wages each year to the association for carrying on a publicity campaign. There is no use attempting to carry on such a campaign without financial support that will make thoroughly effective work possible. This means an enlargement of the scope of the work undertaken by the committee and the employment of field workers to assist in forming local publicity committees throughout the state."

E. J. A.

### The Classification of Pupils by Intelligence Tests

Not infrequently school administrators are using a single test as a basis for grouping, justifying the procedure by the high correlation which the test exhibits with another of accepted reliability. It is the purpose of this paper to show that high correlation between tests may not mean that they are of equal value for purposes of classification.

The scores and ranks of fifty seventh-grade pupils were obtained<sup>1</sup> on the Otis, the Chicago, and the Terman tests. If A, B, and C denote the good, medium, and poor groups respectively, a classification may be made by putting in Group A pupils of ranks 1 to 16, in Group B those of ranks 16.5 to 34.5, and in Group C those of ranks 35 to 50. With no more than fifty pupils the groups will thus be approximately equal in size.

The agreement in classification is shown in Tables I, II, and III. Table I shows that of the 16 pupils placed in Group C by the Otis test, 12 are also placed in the C group by the Chicago test, while 3 are placed in B, and 1 in A. Similarly, of the 19 pupils placed in the B group by Otis, only 8 are so placed by Chicago, the remaining 11 being distributed between the A and C groups. A simple method of expressing the amount of agreement in classification is to find the percent of pupils classified alike by two tests. For Table I the diagonal shows that 28 pupils are thus classified, giving 56 percent of the whole group. In other words, the Otis and Chicago tests place about half of the pupils in the same groups.

TABLE I

		Otis			
		C	B	A	Total
Chicago	A	1	7	8	16
	B	3	8	7	18
	C	12	4	0	16
Total		16	19	15	50

TABLE II

		Otis			
		C	B	A	Total
Terman	A	1	4	11	16
	B	5	9	4	18
	C	10	6	0	16
Total		16	19	15	50

TABLE III

		Chicago			
		C	B	A	Total
Terman	A	1	5	10	16
	B	3	11	4	18
	C	12	2	2	16
Total		16	18	16	50

Individual cases illustrate still more striking differences in classification. In Table III, two pupils are placed in the C group by Terman and in the A group by Chicago, while for one pupil this classification is reversed. Such facts furnish evidence of the need for further checks in classification. Reference to the original scores shows that the two pupils just mentioned are placed in the B group by the Otis test. It thus appears that no two tests agree in the placing of these two pupils; and no doubt some special study is needed to reveal the difficulty. If no other data are available, however, these pupils would be placed with most safety in Group B.

The above results are summarized in Table IV where the relation between correlation and agreement in placement is shown. It will be noted that the lowest correlation occurs where the agreement in placement is highest. The

<sup>1</sup>These data were secured through the courtesy of Doctor F. S. Breed of the School of Education, University of Chicago.

Chicago and Terman tests, with a correlation of 0.68, agree on the placement of 10 percent more pupils than do the Otis and Chicago tests with a correlation of 0.78. In no case is percent agreement in placement as high as the correlation might suggest without such a comparison as this. The above discussion appears to the writer as an additional warning against loose interpretations of coefficients of correlation.

TABLE IV—CORRELATIONS AND PER CENT AGREEMENT IN CLASSIFICATION

	TESTS		
	Otis $\times$ Chicago	Otis $\times$ Terman	Chicago $\times$ Terman
Correlations <sup>a</sup> .....	0.78 $\pm$ 0.04	0.72 $\pm$ 0.05	0.68 $\pm$ 0.05
Percent agreement in Classification ..	56	60	66

<sup>a</sup> The coefficients of correlation were calculated by the product moment method from contingency tables.

As a final word on the classification as discussed above, it may be observed that according to the original data all three of the tests agree as to the classification of 22 of the 50 pupils, while at least two tests agree on 47 of them, the remaining three pupils being the only ones on which there is threefold disagreement. Thus where three such tests are available, a fairly satisfactory classification can be made.

KARL J. HOLEINGER

*University of Chicago*

## National Association of Directors of Educational Research

(E. J. ASHBAUGH, *Secretary and Editor*)

Professor Fletcher Harper Swift of the College of Education, University of Minnesota, has lately been in Arkansas making a study of public school finance, as a part of the state survey of public education in Arkansas now being conducted under the direction of The Bureau of Education.

*Chicago, Illinois.*—Assistant Superintendent Wight, in charge of the Bureau of Educational Research has furnished us with a report of failures investigated in grades 6A and 7B of one school. The proportion of such failures in January, 1921, in 6A ranged from 14 percent in penmanship to 25 percent each in arithmetic, oral composition, and written composition. In 7B the percents ranged from 7 in spelling to 51 in arithmetic. An examination of intelligence by the use of the Illinois Examination indicated that the pupils

were practically normal in mental ability. The achievement quotient or ratio between the accomplishment of these children and the normal accomplishment of children of like mentality showed that they were doing work in arithmetic much below their ability, while the work in reading was much above their mental status.

When achievement quotients are considered, it is quite apparent that the high percent of failure stated above cannot be justified on the basis of intelligence or the ability of pupils if it is granted that the test gives even a fair indication of what they can accomplish. We wonder how many pupils who fail and are compelled to repeat the work of the semester would also show normal mental ability or average grade achievement on the basis of standard tests.

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*Newark, New Jersey.*—Elmer K. Sexton, Assistant Superintendent in charge of the Department of Reference and Research has just sent us a "Spelling Survey in the Public Schools of Newark." The testing was done in May, 1920. Twenty words were selected for each grade, the words being taken from the Ayres list, except in the seventh and eighth grades where the Buckingham Extension and the Ashbaugh Scales furnished the remaining words. Sixty-six percent accuracy was the degree of difficulty of the words used. No word was selected for any grade unless, according to Jones' investigation, it was used by at least two percent of the pupils of the grade. The results of the survey, which involved nearly nine thousand children, show that the lower grades were below standard, while the upper grades were above. Grade three is more than a year below standard while 8A is nearly a year above. It was felt that the large proportion of children from foreign speaking homes accounted for the poor work in the lower grades and it was gratifying to find that handicap overcome by the end of the school course.

One chart represents a comparison of the results in three groups of schools attended largely by pupils of American, Hebrew, and Italian parentage, respectively. The results in the Hebrew schools are best throughout the grades, maintaining uniform position above the Newark median. The American group begins in the third grade at the city average, rises above it in the 5A grade and falls much below for the remainder of the grades, finishing the lowest of the three groups. The Italian group begins more than a year below standard in the third grade, makes rapid strides to the 5A, after which the improvement is less marked; but it finishes above the Ayres' standard and above the American group, although still much below the city median. We should be interested in knowing what other differences exist among the pupils of these three groups besides nationality.

Measurement of the intelligence of the 4B and 8B pupils in eight schools, four of the better and four of the poorer on the basis of surveys in arithmetic and spelling, showed that the intelligence score of the poorer group was below the intelligence score of the upper group, except in the case of one school. This one school, although low in intelligence, showed remarkable pedagogical results, due to splendid teaching, careful organization, and close supervision.

The time devoted to spelling per week varied from 15 minutes to 150 minutes with mode and median at about 75 minutes. The number of words per lesson varied from two in 3A and 5A to fifty in 8A. There is no apparent difference in the time devoted to spelling in the better schools over the poorer schools; while the better schools appear to assign a slightly greater number of words per week. Many of the errors which were commonly found were easily traceable to poor pronunciation.

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*Wisconsin State Department.*—W. J. Osburn, Director of Educational Measurements in the State Department of Public Instruction, has furnished us a twelve-page bulletin on "The Improvement of Ability in Reading." Attention has been called in these columns from time to time to the intensive work which this bureau has been doing in state supervision of reading during the last few years. The bulletin sets forth some general principles and emphasizes the thought that "rapid improvement" lies in the fact that we are learning what to practice, and when to practice it, and that we are discovering more and more how to make even the most formal work interesting to children.

The pupils who are deficient in silent reading ability fall naturally into four classes: (a) those who read carelessly and too rapidly; (b) slow reading; (c) lack of ability to analyze, organize, and supplement the thought contained in the material; (d) inability to remember what has been read, although it may have been well understood at the time. Suggestive exercises in reading material and type of check tests are given which should assist the teacher in remedying each of these difficulties when once recognized. The bulletin contains a type of material which will be greatly appreciated by those teachers and supervisors who have had enough scientific training to understand and value such work. A state department can probably render no greater service, especially to the school in the smaller community, than by furnishing detailed courses of study and specific helps such as are found in this bulletin.

Another report from the same department summarizes the errors in the Hotz Algebra test given in thirty-six schools in March and April, 1921. This summary of errors, together with the illustrative examples with specific wrong answers given, should be exceedingly helpful to the Algebra teachers of the state in focusing their attention upon the phases of Algebra which are likely to need emphasis.

This assumes, of course, that the types of examples and problems in this series of Algebra tests are the types of Algebraic work which it is the function of the schools to teach.

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We are glad to announce the election of the following persons to membership in our association since the publication of the list in the May 1921 issue. Members who, from time to time issue material should add these names to their previous mailing list in order that all members of our association may receive the material.

Breed, F. S., University of Chicago, Chicago, Ill.

Clarke, J. R., Teachers College, Columbia University, New York City.

Caldwell, O. W., Lincoln School, Teachers College, Columbia University, New York City.

Cubberley, E. P., Leland Stanford University, Stanford University, California.

Charters, W. W., Carnegie Tech, Pittsburgh, Pennsylvania.

Freeman, F. N., University of Chicago, Chicago, Ill.

Gates, Arthur L., Teachers College, Columbia University, New York.

Hollingsworth, Leta (Mrs.), Teachers College, Columbia University, New York.

Hughes, W. H., Supervising Principal, Claremont, California.

Inglis, Alexander J., Harvard Graduate School, Cambridge, Massachusetts.

Knight, F. B., University of Iowa, Iowa City, Iowa.

Koos, L. V., University of Minnesota, Minneapolis, Minnesota.

Miller, W. S., University of Minnesota, Minneapolis, Minnesota.

Myers, Garry C., Cleveland School of Education, Cleveland, Ohio.

Neale, M. A., University of Minnesota, Minneapolis, Minnesota.

Peterson, Joseph, Peabody College, Nashville, Tennessee.

Pressey, L. C. (Mrs.), Ohio State University, Columbus, Ohio.

Pressey, S. L., Ohio State University, Columbus, Ohio.

Stenquist, J. L., Bureau of Reference, Research, and Statistics, Public Schools, New York City.

Swift, F. H., University of Minnesota, Minneapolis, Minnesota.

Strayer, G. D., Teachers College, Columbia University, New York City.

Stevenson, P. R., Ohio State University, Columbus, Ohio.

Toope, H. A., Teachers College, Columbia University, New York City.

Williams, J. Harold, Bureau of Juvenile Research, Whittier, California.

Witham, E. C., Superintendent of Schools, Putnam, Connecticut.

Washburne, C. W., Superintendent of Schools, Winnetka, Illinois.

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## ARITHMETIC ABILITY OF MEN IN THE ARMY AND OF CHILDREN IN THE PUBLIC SCHOOLS<sup>1</sup>

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When psychological examining in the army offered an opportunity to study the arithmetic ability of adult men through the scores made on Test 2 of the Alpha Group Examination, it was thought that a comparison of these scores with the results from giving the same test to children in the public school might contribute something to the problem of setting an ultimate standard for achievement in arithmetic in the grade schools, a problem which has been the subject of many investigations and studies. An arithmetic test has perhaps never been given to so large a group of adult men before.

It ought not to be necessary to describe the psychological examining in the army. This has been done in current magazines, as well as in the book, *Army Mental Tests*, edited by Majors C. S. Yoakum and R. M. Yerkes.<sup>2</sup>

In order to examine the relation between scores received in arithmetic and amount of school education, the records of 2,500 random cases of drafted men were examined. These cases may be considered as typical of a much larger group, namely, the men from Washington, Oregon, Idaho, Montana, Wyoming, Utah, North Dakota, South Dakota, Minnesota, Nevada, and California—the states which contributed men to Camp Lewis, Washington. Moreover, the birthplaces of these men were in practically every state in the Union, and many of them had fairly recently moved to the above named states. In a sense, therefore, they can be said to represent the whole country.

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<sup>1</sup> The writer wishes to acknowledge his indebtedness to Professor Clifford Woody, University of Michigan, for suggestions and encouragement in making this study.

<sup>2</sup> Yoakum, C. S. and Yerkes, R. M. *Army mental tests*. New York: Henry Holt and Company, 1920. 303 pp.

In order to compare the arithmetic ability of elementary-school children with that of mature men, Test 2 of the Alpha Scale was given to 632 children in the grades IV-B to VIII-A, inclusive, according to the directions given in the Examiner's Guide furnished the Psychological Examiners by the Surgeon General's Office. The children tested were of the Gatewood School, Seattle, the Sehome and Franklin schools, Bellingham, and the Training School at the Bellingham State Normal.<sup>3</sup> The test was also given to a class of third-grade children, but a number of the scores were "one" and "zero," indicating that the test was too difficult for them. These third-grade records were therefore disregarded.

For further comparison, the Alpha examination was given to 424 first-year students and 301 second-year students at the Washington State Normal School, Bellingham. The majority of these students were tested during the first part of the spring quarter; the rest were tested during the summer quarter. The summer group contained perhaps a greater percent of mature students than did the spring group, but not enough to affect the results materially.

The data used in answering the questions raised in the latter part of the discussion were gathered from the Alpha Group Examination blanks of enlisted men and officers. The scores of the enlisted men were in all cases those of unselected groups. The scores of the officers were chosen in several instances, because certain of their statements on the information blanks were thought to be more reliable than those of the enlisted men.

A few discrepancies may have crept in, but on the whole the information may be considered accurate, for it was given under military command, and the importance of care in answering the questions was fully realized by the men.

#### ARITHMETIC ABILITY AND SCHOOLING OF ARMY MEN

Table I and its graphical representation, Figure 1, showing for the 2,500 men the distribution of scores (i.e., the number of problems right) according to the school year they had passed, reveals a steady increase in arithmetic ability from grade two upward until the senior year of the high school is reached. There

<sup>3</sup>The writer wishes to express to the principals and teachers of these schools his deep appreciation of their willing cooperation.

seems to be little difference between those who have done one, two, or three years of college work. The college graduate seems to have an advantage over the non-graduate. The drop from a median score of 6.5 for those who had no schooling to a median score of 2.5 for those who dropped out of school after passing the second grade might be explained by saying that the latter group consisted of school misfits, who had no interest in acquiring any arithmetic ability later in life. The number of cases for these groups is too small, however, to be considered very reliable.

TABLE I. ARITHMETIC SCORES OF 2,500 ARMY MEN ACCORDING TO SCHOOLING

SCHOOL GRADE PASSED	ARITHMETIC SCORE		NUMBER OF CASES	SCHOOL GRADE PASSED	ARITHMETIC SCORE		NUMBER OF CASES	
	Mean	Median			Mean	Median		
Grade School				High School				
	0	6.2	6.5		1	9.5	10.1	153
	1	6.4	5.2		2	10.1	10.6	125
	2	4.0	2.5		3	10.4	11.7	74
	3	4.6	4.7		4	11.7	12.4	103
	4	5.4	5.8		.....	.....	.....	.....
	5	6.0	6.6		1	11.2	12.2	48
	6	6.5	6.8		2	11.8	12.3	42
	7	6.9	7.5		3	11.9	12.0	36
College	8	8.5	8.9		4	13.2	13.5	32
	.....	.....	.....		5	14.0	14.5	6

The mean score on the arithmetic test for the 2,500 men was 8.09, which was 0.41 below the eighth-grade mean and 1.19 above the seventh-grade mean. The median score (8.62) was 1.12 above the seventh-grade median and 0.28 below the eighth-grade median.

The coefficient of correlation between the arithmetic score and the grade passed is  $+0.571 \pm 0.009$ , showing a definite relationship between the score received and the grade passed. The regression equation  $y=0.704x+2.59$  yields a close agreement with the curve from the third to the twelfth grades. ( $x$ =year passed in school, continuing the count up from 8 for the high school

and beyond;  $y$  = arithmetic score.) This equation indicates that for each additional grade passed above the third, one may expect an increase of seven-tenths of one point in arithmetic ability as measured by this test.

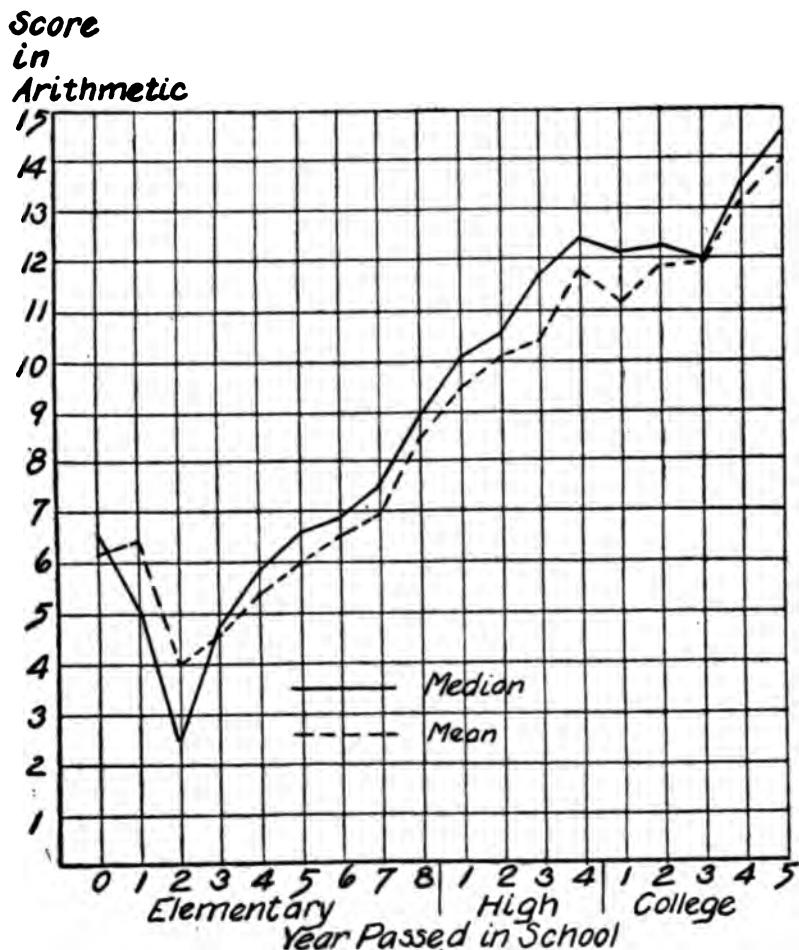


FIGURE 1. ARITHMETIC SCORES OF ARMY MEN ACCORDING TO SCHOOLING

## ARITHMETIC ABILITY OF SCHOOL CHILDREN

An examination of Table II, giving the median and mean scores by grades for the 632 children who took the arithmetic test of the Alpha Scale shows a steady increase from IV-B to VIII-A, with the greatest changes from IV-B to IV-A, and from VII-A to VIII-B, and with practically no changes from IV-A to V-B, and from VIII-B to VIII-A. The greatest range of scores was found in VII-B, though the most uniform range was in VI-B.

TABLE II. ARITHMETIC SCORES OF 632 SCHOOL CHILDREN

GRADE	ARITHMETIC SCORE		NUMBER OF CASES
	Mean	Median	
IV-B	3.8	4.25	37
IV-A	5.0	5.8	76
V-B	5.5	5.8	44
V-A	5.8	6.5	56
VI-B	6.3	7.0	64
VI-A	7.2	8.0	67
VII-B	7.5	8.35	69
VII-A	7.7	8.5	82
VIII-B	8.8	9.7	58
VIII-A	9.3	9.8	79

The coefficient of correlation between the school grade and the arithmetic score for the 632 children is  $+0.578 \pm 0.018$ , almost the same as was found for the men in the army, which was  $+0.571$ . The regression equation,  $y = 1.06x + 0.66$  when compared with the equation for the army men ( $y = 0.704x + 2.59$ ) shows that for the lower grades the army men have the higher scores, but that the increase in arithmetic ability per grade is greater for the school children, the relation of the increases being as 1.06 is to 0.704. The same difference is distinctly shown in Figure 2, which presents the graphs for both distributions. The equation also indicates that in general, for each advance of one grade, the arithmetic ability as here measured increases by 1.06 points, or, in other words, that pupil A, one grade beyond pupil B, ought to be able to work fully one problem more than pupil B.

From the above comparison of the two regression equations and from a comparison of the two graphs, the following conclusions may be drawn.

1. The individual who leaves school before reaching the sixth grade will add to his ability to solve arithmetic problems. The lower the grade he fails to complete, the greater is the increase in ability above what he possessed at the time of leaving

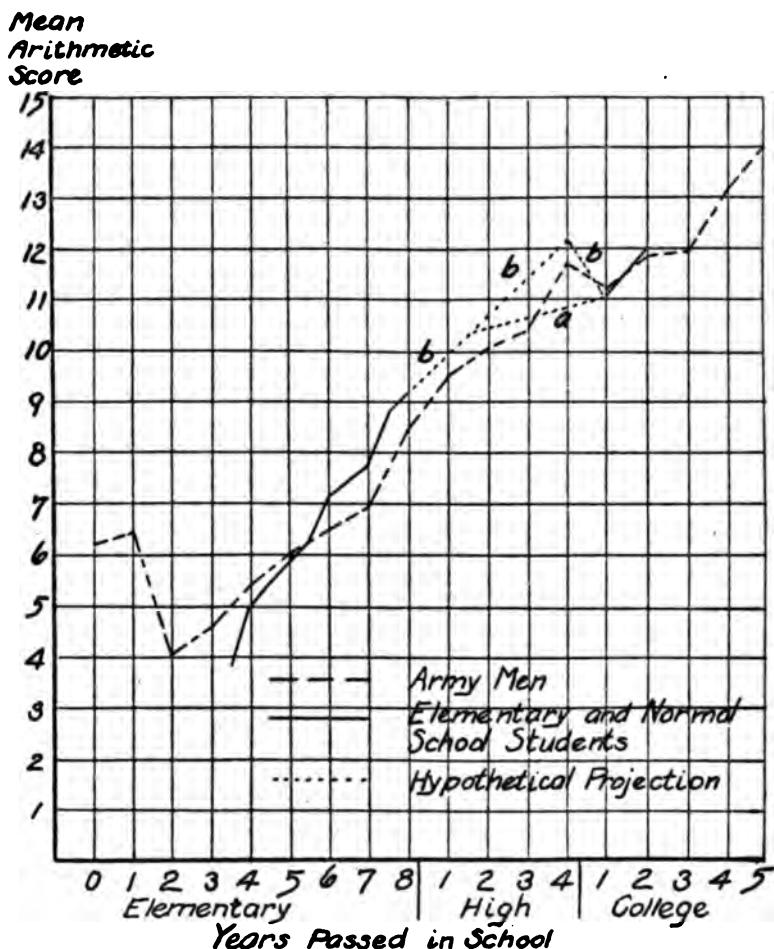


FIGURE 2. COMPARISON OF THE ARITHMETIC ABILITIES OF ARMY MEN WITH THAT OF SCHOOL CHILDREN ACCORDING TO GRADE PASSED

school, if we consider only those men who are literate according to the army definition. The relatively high scores made by men who had no schooling or but one year may be explained by supposing this group, relatively a small one, to be composed of persons who might be termed "self-educated" and self-confident, inasmuch as they did not hesitate to remain with the larger group at the time of examination, when those who had not passed the fifth grade or had not had the equivalent of a fifth-grade education were asked to step aside.

2. The individuals who complete the VI-B grade will have in later life approximately the same arithmetic ability as they had at the time of leaving school.

3. Those who go beyond the VI-B grade (within the elementary school) will in later life lose some of their schooltime proficiency, from 8.6 percent to 10.4 percent of what they had at the time of leaving school.

4. Since the two curves (Figure 2) are practically parallel from grades VI-VIII, the adult who completed the eighth grade has retained as much more ability than the one who completed but the seventh grade, as he originally added to his ability during the year spent in the eighth grade.

How far beyond the eighth grade the curve for school children would remain above the curve for adults if data had been collected for high-school pupils, cannot be definitely stated. The Alpha examination, however, was given to 424 juniors (first-year students) and 301 seniors (second-year students) at the Washington State Normal School, Bellingham. The following averages were obtained for Test 2: juniors, median = 11.67, mean = 11.04; seniors, median = 12.46, mean = 12.01. These mean scores may be compared with the mean scores for enlisted men who had completed one and two years of college work.<sup>4</sup>

The comparison shows that the one-college-year men made 0.16 point more than the normal-school juniors, while the normal-school seniors made 0.21 more than the two-college-years men. In Figure 2 this condition for the normal-school students is shown by the fragment of the full-line curve lying between "College 1" and "College 2." The problem now is to join this fragment to the curve representing the performance of pupils of the elementary

<sup>4</sup> In the army testing men were listed as having done college work if they had attended any institution having high-school graduation as an entrance requirement.

school. Two constructions are possible (besides others intermediate between them). First, if the schooltime arithmetic ability of the normal-school students can be considered superior to that of high-school seniors, the connecting curve would probably continue to parallel the army curve until about the second high-school year and would then intersect the army curve between the third and fourth high-school years. The course which the connecting curve would take according to this supposition is marked *a* in Figure 2. Second, if on the contrary the ability of high-school seniors can be considered greater than that of normal-school juniors, as it is for the army men, the connecting curve might extend upwards to the fourth year of the high school and then drop abruptly (as does the army curve) to the first college year. This alternative is represented in Figure 2 by the connecting curve marked *b*. A reasonable conclusion might be: The individual who leaves school anywhere from the sixth grade to the third—or perhaps fourth—year of the high school may expect to lose some of the ability for solving arithmetic statement problems that he had gained while in school.

#### ARITHMETIC SCORES AND AGE OF SUBJECTS

One question presents itself in reviewing the arithmetic ability of mature men: Is there any definite consistent relationship between scores made and the ages of the subjects tested, which might color the interpretation of the results given above? In order to answer this question the arithmetic scores of the 424 normal-school juniors and the 301 seniors were distributed according to age. For the juniors there were so few cases in each year above 26 that these were all combined in one interval—"over 26." All the seniors above 27 were likewise put in one group.

An examination of the median scores for each year reveals a steady increase for the juniors from age 18 to age 22. Yet the differences are very small, and when viewed in the light of the range of scores within each age group (year 18, 6 to 19; year 20, 3 to 18; etc.) they are of little importance. The variation in the median scores for the seniors is greater with very little tendency towards uniformity. The distribution of students according to age is also less regular indicating that a greater number of factors influence the time and age at which senior students continue their studies.

TABLE III. ARITHMETIC SCORE FOR NORMAL-SCHOOL STUDENTS

AGE	JUNIORS		SENIORS		JUNIORS AND SENIORS MEDIAN
	Median	Number of Cases	Median	Number of Cases	
15	10.5	2	.....	.....	10.5
16	11.5	10	.....	.....	11.5
17	11.5	64	10.5	4	11.8
18	11.2	90	10.5	11	11.15
19	11.5	73	11.1	21	11.3
20	11.6	62	13.25	38	12.3
21	11.75	31	12.4	34	12.2
22	11.9	16	13.3	45	12.4
23	11.25	15	13.4	34	11.9
24	12.5	6	12.3	23	12.7
25	12.5	4	12.3	26	12.4
26	12.8	10	13.0	9	12.85
27	12.0 <sup>a</sup>	41 <sup>a</sup>	12.8	8	12.8 <sup>a</sup>
over	.....	.....	12.85	48	.....
27	.....	.....	12.85	48	.....

These entries are for students over 26 years of age.

If age influences but little the distribution of the arithmetic scores of students actually in school, would it not have less influence in the case of individuals who have been out of school for some time? Would not numerous other factors tend to counteract this age influence, if it does exist?

#### ARITHMETIC ABILITY AND ARMY RANK

The arithmetic scores of 532 officers were distributed according to rank, with mean and median results as shown in Table IV.

The mean and the median scores for each rank vary but little. Judged by the "number right" the second lieutenants seem to have greatest arithmetic ability, the captains the least, and the majors and first lieutenants about the same. The distributions—which are not here reproduced—indicate more centralized scores for the majors and captains. The majors appear to be somewhat more accurate than the other groups.

Success in advancement as commissioned officers does not seem to be correlative with ability to solve arithmetic problems,

but an examination of the errors made indicates a fairly steady decline from the number made by second lieutenants to the number made by majors. This suggests a slight correspondence between rank and accuracy, although there are notable exceptions.

TABLE IV. ARITHMETIC SCORES AND ARMY RANK

	NUMBER RIGHT		NUMBER WRONG		NUMBER OF CASES
	Mean	Median	Mean	Median	
Majors.....	11.9	12.4	1.58	2.1	24
Captains.....	11.6	11.9	2.13	2.4	136
First lieut...	11.9	12.5	2.10	2.1	242
Second lieut.	12.6	12.9	2.19	2.3	131
VIII-A grade children.....	9.3	9.8	2.49	2.47	79

A comparison of the scores of the children in the VIII-A grade shows how far below the officers' scores they are. Remembering that the arithmetic ability of the men who had only finished the eighth grade is somewhat below that of the children actually in that grade, one can readily see that success as an army officer is accompanied by an ability above that reached in the grade schools. It is more nearly equal to the ability of the men who have graduated from high school.

#### ARITHMETIC ABILITY AND BRANCH OF ARMY SERVICE

Figure 3 represents the mean arithmetic scores of 532 officers distributed according to the arm of the service to which each belonged.

Excluding those officer groups whose frequency is less than twelve, the following is the ranking in arithmetic ability based on the mean number of problems right: (1) field artillery; (2) signal corps; (3) infantry; (4) chaplains; (5) quarter masters' corps; (6) medical; (7) dental. If the median were used the order would be: (1) field artillery; (2) chaplains; (3) signal corps; (4) infantry; (5) quarter masters' corps; (6) dental; (7) medical.

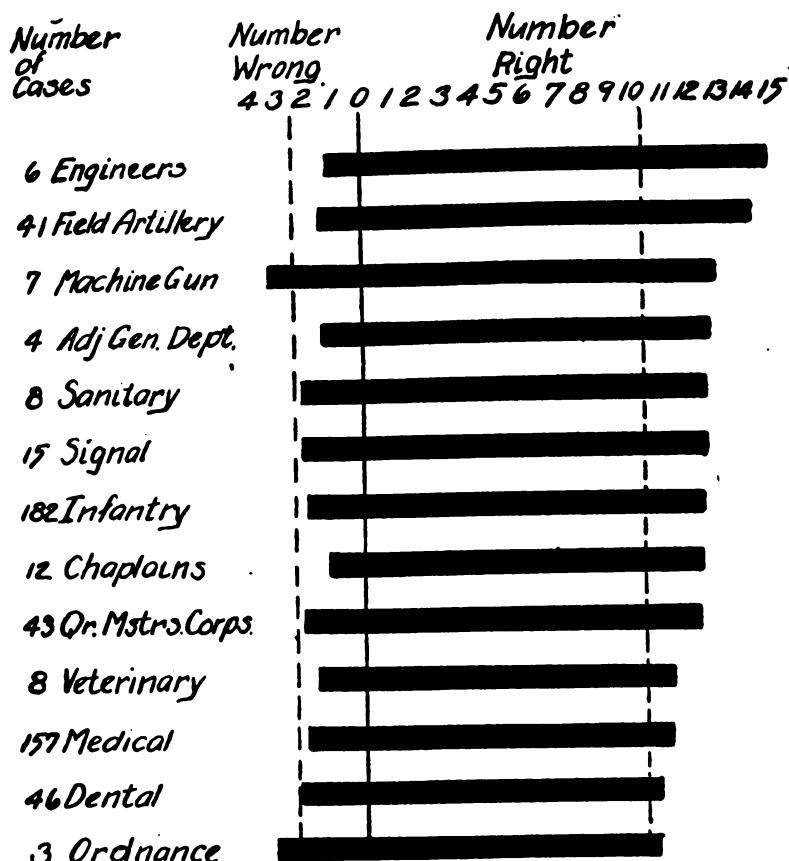


FIGURE 3. ARITHMETIC SCORES OF ARMY OFFICERS. (DASHED LINE SHOWS POSITION OF MEAN FOR CHILDREN OF THE 8A GRADE)

Here again a comparison of these scores with the scores of the VIII-A grade children reveals that the children have not secured the proficiency necessary for being Army officers in the various lines of service discussed. The dashed lines on Figure 3 representing the VIII-A performance bring out the fact that elementary-school graduates have considerably less ability than most officer groups and are considerably below those for all officer groups except "Ordnance." It is true that some of the eighth-grade children have an arithmetic ability equalling, and in a number of instances, surpassing the arithmetic ability of some of the officers.

But in terms of averages there is a considerable difference between all but the lowest officer groups on the one hand and eighth-grade pupils on the other hand.

#### ARITHMETIC ABILITY AND PRE-WAR OCCUPATION

It is generally conceded that all occupations do not require the same arithmetic ability, and that there are occupations in which the solving of arithmetic problems seldom occurs. But which occupations require this ability, which offer opportunity for continued use of this ability? These questions cannot be answered definitely here, but the distribution of arithmetic scores of 417 officers according to their pre-war occupations may be suggestive. All occupational groups with less than seven men were eliminated from this comparison. It must be remembered, however, that these figures are no more reliable than similar figures derived from occupational groups of seven or more persons each, who have been brought together without reference to their ability in arithmetic.

Table V gives the mean number of problems solved correctly, the mean number of problems solved incorrectly, the percent of accuracy (being the number right divided by the sum of the number right and the number wrong), and the number of officers in each group. The occupations are ranked according to mean number correct. As is readily noted, there is practically no relationship between the number right and the percent of accuracy; one group (merchant) which fell relatively low in "number right" has the next to the highest accuracy index (90.4), a case of "slow but accurate." Again "banking" ranks seventh in accuracy but sixteenth in number right. "Teacher" comes ninth in correct solutions but eighteenth, the lowest of these groups, in accuracy. On the whole, as one would expect, the scores correspond with the occupations ordinarily thought of as requiring ability to solve arithmetic problems. There are a few unexplained rankings, however. Should not "merchant" and "banking" groups rank above the thirteenth and sixteenth positions? Why does "clergyman" have such a high ranking both as to solutions and accuracy? The reader will no doubt have some answer in the light of his own observations. Any answer attempted here would have no greater significance.

Might this distribution point to the need of directly measuring the arithmetic ability of large numbers of men—and women—in the various occupations, to determine the amount they have lost of their schooltime ability, or the amount they have gained through activity in a certain line of work?

The mean scores for the grade children indicate an arithmetic ability far below that which seems necessary for success in the occupations here listed. The cases here presented are probably

TABLE V. SCORES MADE ON ARITHMETIC TEST BY 417 OFFICERS ACCORDING TO PRE-WAR OCCUPATION

PRE-WAR OCCUPATION	NO. RIGHT (MEAN)	NO. WRONG (MEAN)	ACCURACY PERCENT	NUMBER IN GROUP
Real estate and insurance..	14.9	1.6	90.3	8
Business manager.....	14.1	2.25	86.2	16
Clergyman.....	13.7	1.2	91.9	12
Clerk.....	13.7	2.0	87.2	13
Engineer.....	13.5	1.6	89.4	27
Salesman.....	13.5	2.1	86.6	16
Lawyer.....	13.3	2.0	86.9	20
Student-college.....	13.2	1.7	88.6	31
Teacher.....	13.0	3.1	80.7	7
Chemist and pharmacist...	12.9	1.75	88.0	8
Accountant.....	12.8	2.2	85.3	14
Farmer.....	12.8	2.4	84.2	13
Merchant.....	12.3	1.3	90.4	7
Surgeon.....	12.1	1.4	89.6	8
Physician.....	11.2	2.2	83.5	147
Banking.....	11.1	1.5	88.1	8
Soldier.....	10.8	2.3	82.4	37
Dentist.....	10.1	2.1	82.7	25
<hr/>				
VIII-A Grade School Children.....	9.3	2.49	78.8	79

rather highly selected, however, as they were clerks, salesmen, etc., who were also good enough to become army officers. Hence it is probably not unreasonable to suppose that they were in general "successful" in their occupations.

It is true that a certain percent (about 30) of the VIII-A grade children and even a very few of the sixth- and seventh-grade pupils have reached an ability equal to the mean score of the lowest occupational group, that of "dentist." But should not

all eighth-grade graduates have an ability at least equal to that of the occupational group "real estate and insurance"? Or, if the reader considers this too high, should not the mean score for eighth-grade pupils equal the mean score for "clerks"? Or must those of our grade-school graduates who become clerks increase their arithmetic ability by nearly 49 percent after they leave school and begin work? Should they not rather reach such a point while in school so that they can lose some of this school-time ability, as the majority seem to do, and still have sufficient for the various ordinary occupations they may enter?

#### SUMMARY OF CONCLUSIONS

The "average" American literate man has an ability for solving arithmetic statement problems that compares favorably with that possessed by seventh-grade children. The mean score for the 2,500 men is about one-third of the distance from the mean for the VII-A children toward the mean for the VIII-B children. The adult median is slightly above the VII-A median.

There is a definite relationship between the school grade finished and one's ability in later adult life to solve arithmetic statement problems, which is especially marked for those who have not proceeded beyond the high school. This relationship between school grade and arithmetic score for mature men is very nearly equal to that for school children, as seen by the coefficients of correlation,  $r = +0.571$  for the men, and  $r = +0.578$  for the children.

The individual who leaves school before reaching the sixth grade will add to his ability to solve arithmetic statement problems; he who completes the VI-B grade will have in later life approximately the same ability as he had in school; he who leaves school anywhere from the sixth grade to the fourth year of the high school may expect to lose some of his schooltime proficiency in arithmetic. The instruction in arithmetic in the seventh and eighth grade does not seem to be as valuable relatively as that in the preceding grades; yet, the adult who finished the seventh or the eighth grade retains as much more of arithmetic ability than he who completed but the sixth or the seventh, respectively, as he acquired during the added year in school. The increase in ability during the eighth year exceeds that acquired during the seventh year, however. Has a point been reached in the sixth grade where the returns from instruction are less than

in preceding years? In other words, is the sixth grade the turning point in arithmetic instruction where the "law of diminishing returns" sets in?

Eighth-grade arithmetic ability is far below that which is seemingly required by army officers in all branches of service here discussed.

The arithmetic ability of eighth-grade graduates, either at the time of graduating or later in life, is seemingly not sufficient for success in some eighteen occupations listed in this study.

A small percent of the elementary-school pupils and of those army men who completed the eighth grade but did not continue their school studies, have reached the mean arithmetic scores made by the army officers and the various occupational groups; but, should not the majority, if not all, eighth-grade graduates have an arithmetic ability at least equalling, if not surpassing, the ability seemingly necessary for success in these occupations?

Since only 55 percent of the boys complete the eighth grade and only 23 percent continue into high school, the arithmetic instruction that the majority are to have must come in the elementary school. Some lines of knowledge may increase as the individual grows older, but there is little, if any, parallelism between age and arithmetic ability for adults, so dependence on such presupposed relationship will fail.

Even if we are willing to grant that an arithmetic ability equal to that of an eighth-grade graduate is sufficient for most social purposes, there are 45 percent who have not reached this point in school; and the 55 percent who have may expect to lose in later life at least 8.6 percent of their schooltime ability.

But we have seen that the eighth-grade ability—considerably higher than that of adults with the same school education—does not equal the arithmetic ability of the lowest occupational group listed—that of "dentist." Indeed the lowest school group whose mean score equals that of the dentists is the second grade of the high school, a grade reached by only 18.6 percent of the boys. The mean score for "clerks" is reached by only 1.5 percent of the army men.

The present standard in arithmetic instruction as measured by this test—at least in the schools tested—seems to be too low; but without further investigation we cannot well decide what it should be.

An ultimate standard in arithmetic must be set high enough to allow for a loss of from 8.6 percent to 10.4 percent for the upper three grades of the elementary school.

## SCHOOL FINANCE IN IOWA

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During the past year a study has been made of the condition of school finance in Iowa. It is the purpose of this article to show two things; first, how the amount of money going to school purposes in Iowa cities and towns compares with the amounts which these same cities and towns are spending on other items, such as light, water, streets, etc.; second, how the school money is spent by the school authorities after it comes into their hands.

### EXPENDITURES FOR SCHOOLS AND FOR OTHER MUNICIPAL PURPOSES

Data on 459 Iowa cities and towns are presented in this summarized article. This represents a very large majority of all the towns in the state. The last state census (1915) gave Iowa 103 towns having more than 1000 population. Data are here reported on 148 such towns. The discrepancy in the figures is, of course, accounted for by the lapse of time (1915 census). Of the 685 towns under 1000 population 486, or 71.0 percent, are here reported. This material was gathered in two ways, first by sending to each county auditor a card for every town within his county, with careful instruction as to his filling it out and returning it<sup>1</sup>; second, by personal visits to those counties whose auditors did not respond, even after the request had been repeated.

For the purpose of rendering the comparison more usable and more dependable the cities and towns were divided into six groups according to population, as shown in the tables below. The method used in making these comparisons was not that of comparing the actual sums of money spent but the millages as levied for the various purposes. The millage used in all cases was that finally assessed upon the property, hence comparison is fair and

<sup>1</sup> This card called for many other things which are not dealt with in this article.

accurate. On the one side were thrown all millages going to school purposes. These in Iowa fall almost entirely into two categories so far as the tax is concerned, namely, the general fund and the schoolhouse fund. On the other side were put all millages as assessed for municipal purposes other than schools. These included water, light, streets, bonds, police, library, fire, sewers, sanitary, and in some cases many other items. The totals in both cases were then added and the school millage divided by the resulting total. This gave a percent which represented accurately the proportion of local taxes that were available for the schools of the city or town. To make this method clear the following illustration is cited. Sioux City, Iowa, had a school levy of 67 mills. All other municipal levies totaled 26.9 mills. The total local levy was then 93.9 mills. Of this total, the school levy was therefore 71.3 percent. This represents the proportion of local taxes for school purposes in Sioux City.

The median percents for all the towns, grouped according to population, are shown in Table I. The consolidated districts are dealt with separately, as is obviously necessary. Column 5 of the table, which is labeled "coefficient of variability" shows a very significant thing in regard to each of the groups. In dealing with a large number of cities, as these figures do, it is very convenient to have one figure which will express in itself as many facts as possible. This coefficient of variability expresses what could otherwise be shown only by giving the percents for all the towns in each group or at best by giving the quartiles and ranges. The quartiles in the groups that here show the largest coefficient, (towns of less than 500 population) are 75.7 percent and 54.5 percent. The group showing the lowest coefficient, (cities having populations between five and ten thousand) has quartiles of 68.7 percent and 59.6 percent. (The coefficient is a measure of the amount of deviation from the percent given for the group) The lower the coefficient the more nearly do all the towns conform to the median percent here given.

Table I shows that all Iowa towns and cities of whatever sizes, whether located in a consolidated district or not, *spend more*

TABLE I.—RELATION OF EXPENDITURES FOR SCHOOLS TO EXPENDITURES FOR OTHER MUNICIPAL PURPOSES IN IOWA

## TOWNS AND CITIES

POPULATION GROUPS	NUMBER OF DISTRICTS	PERCENT OF LOCAL TAX GIVEN TO SCHOOLS	RANK	COEFFICIENT OF VARIABILITY	RANK
1	2	3	4	5	6
<b>TOWNS</b>					
Less than 500.....	200	65.4	2	.162	6
500-999.....	111	65.7	1	.144	5
1,000-1,999.....	70	64.6	3	.124	4
2,000-4,999.....	50	60.6	5	.101	3
5,000-9,999.....	15	62.7	4	.073	1
10,000 and over...	13	59.4	6	.087	2
<b>CONSOLIDATED DISTRICTS</b>					
Less than 500.....	115	67.3	1	.131	2
500 and over.....	60	59.0	2	.113	1

on their schools than on all the other objects of municipal expenditures combined. In the cities and towns outside of consolidated districts this table provides an adequate basis for the statement that the larger the city the smaller the percent of total municipal expenditure which goes to schools. This is not necessarily a criticism of the larger city. In fact other data in the possession of the author but not here presented show that the highest per pupil school expense in Iowa cities outside the consolidated districts was in that group of cities that spent the lowest percent of their total municipal levy for schools, namely the group of cities having populations of over 10,000. This group which apportioned but 59.4 percent of the total municipal levy for schools, spent \$107 per pupil; while the groups under 1000 in population apportioned about 65 percent of their levy to schools, but by so doing they obtained but \$86.60 per pupil. The descending percent of total municipal expense going to schools as the cities grow larger may be as well accounted for by the increase in other municipal expense as by the decrease in amount of school support. In fact, the former is in most cases the explanation.

In the consolidated schools, the percent of local tax available to school purposes is expected to be high as compared with town

districts. In towns of less than 500 located in consolidated districts there is about a two percent difference made by the fact of consolidation. That is, the towns without consolidation spend but two percent less of their local tax for schools than do those with consolidation. In towns of over 500, however, consolidation cuts down the share about five percent. These figures might serve as a financial argument for consolidation in the larger villages and towns. In general the percents given in Table I could be very profitably used by individual towns as a basis for comparison. The percent given for each population group is the standard practice in Iowa towns of the indicated size (in so far as the median represents the standard); and any one may compare the local school levy with this standard.

The coefficients of variability show that the practice in the larger towns is far more uniform than that in the smaller. It is a striking fact that just as the former statement, "the larger the town the lower the percent," holds true, so here the data justify a statement exactly the reverse, namely, "the smaller the towns the greater the lack of uniformity in practice." The correlation with size (groups alone being considered) is in both cases practically unity.

#### HOW THE SCHOOL MONEY IS SPENT BY THE SCHOOL AUTHORITIES

The following tables give school expenditures data on 132 city, town, and consolidated-school districts. These data while not nearly so extensive as those presented in the foregoing section of this article, do cover a large enough portion of the possible cases to render the findings fairly reliable.

In this study, the 132 school budgets involved were grouped according to magnitude, three groupings being used as indicated in the sub-titles of Table II. The items of expense used conform closely to the system adopted by the N. E. A. and by the Federal Bureau of Education. The percents are the medians for the

groups to which they refer.<sup>2</sup> The coefficients of variability show the same facts for Table II as for Table I, namely, the amounts of deviation from the median percents. The expense items are arranged in descending order of magnitude and the coefficients of variability are ranked for each of comparison.

TABLE II (A.)—PROPORTION OF EXPENDITURES FOR VARIOUS PURPOSES. BUDGETS OF \$60,000 AND OVER

CLASSIFICATION	PERCENT	RANK	COEFFICIENT OF VARIABILITY	RANK
Teaching.....	64.8	1	0.092	7
Operation.....	16.6	2	0.241	6
Debt Service.....	7.8	3	0.330	4
Administration.....	4.8	4	0.265	5
Maintenance.....	3.2	5	0.655	2
Fixed Charges.....	1.1	6	0.590	3
Auxiliary Agencies.....	0.4	7	2.060	1

(B.)—BUDGETS OF \$20,000 TO \$59,999

CLASSIFICATION	PERCENT	RANK	COEFFICIENT OF VARIABILITY	RANK
Teaching.....	63.7	1	0.084	7
Operation.....	14.3	2	0.266	5
Administration.....	9.4	3	0.135	6
Debt Service.....	7.4	4	0.561	4
Maintenance.....	1.4	5	0.895	3
Fixed Charges.....	0.8	6	1.094	1
Auxiliary Agencies.....	0.6	7	1.000	2

(C.)—BUDGETS OF LESS THAN \$20,000

CLASSIFICATION	PERCENT	RANK	COEFFICIENT OF VARIABILITY	RANK
Teaching.....	56.5	1	.121	7
Operation.....	15.8	2	.253	5
Administration.....	15.1	3	.154	6
Debt Service.....	4.95	4	1.162	3
Maintenance.....	1.65	5	.681	4
Fixed Charges.....	0.65	6	1.960	1
Auxiliary Agencies.....	0.45	7	1.553	2

<sup>2</sup> These medians do not total to 100, nor could this be expected in the case of medians. The fact, however, that the totals are in all cases less than 100 (ranging from 95.1 to 98.7) indicates that items of small expenditure have been omitted. This does not affect the reliability of the figures appearing in the table.—Editor.

## (D.)—BUDGETS OF CONSOLIDATED SCHOOLS

CLASSIFICATION	PERCENT	RANK	COEFFICIENT OF VARIABILITY	RANK
Teaching.....	39.5	1	.146	8
Transportation.....	21.6	2	.257	6
Debt Service.....	11.11	3	.509	4
Operation.....	10.95	4	.338	5
Administration.....	9.85	5	.213	7
Maintenance.....	1.30	6	1.077	2
Auxiliary Agencies.....	0.65	7	.692	3
Fixed Charges.....	.50	8	1.300	1

There are certain things common to all of these groups of budgets. *First*, teaching requires the largest percent of money and is the least variable. That is to say, in these Iowa systems teaching is the largest item of expense and the one about which there is the most agreement as to the proportion of school money devoted to it. *Second*, debt service in all cases ranks as the third or fourth item of expense. *Third*, next to teaching, administration shows the greatest agreement as to the proportion of expense. *Fourth*, maintenance, auxiliary agencies, and fixed charges are the three items consistently requiring the smallest proportion of the budget, and they are also the three showing the widest variation.

The condition regarding debt service should be commented upon. That Iowa schools are running upon borrowed money to such an extent that the annual expenditure for such service ranks in many instances next to that for operation of the plant is a situation hardly financially sound. The pay-as-you-go policy has been neglected in past years by Iowa towns. Moreover, depreciation in plant has not been recognized, and little thought has been given to the needs of the future. The school plant has been used to the extent of its possibility and then bonds have been voted to erect another. A reasonable degree of business sense, in the financial management of these schools in years past, would have dropped this item to the rank it should rightly take in any enterprise. The existence of laws that recognize the fundamental factors of plant depreciation in the continued existence of any corporation would have had or would now have the same effect

on public school finances as the investment sense of the American public and corporation law have upon the management of enterprises that depend for their existence upon sound financing. The data which this table presents are concrete evidence of the day- unto-day haphazardness of public school financing of the past. No business enterprise could exist with such a management and there are many who are beginning to believe that even the vast resources of the American state are reaching the limit of taxation.

In general it may be said that, among Iowa town- and city- school systems, items of expense rank as follows: first, teaching; second, operation; third, or fourth, administration or debt service; fifth, maintenance or auxiliary agencies; sixth, maintenance or fixed charges; and seventh, auxiliary agencies or fixed charges. The exact order of these items and the percents here given should be of value to any superintendent or school board planning a new budget.

In the budgets of consolidated districts, transportation and debt service occupy respectively the second and third positions. This means that the consolidated schools of Iowa are paying nearly as much to get the children to school as to educate them after they are there. The means is costing nearly as much as the end. This does not mean that the consolidated schools have poorer teachers or are paying less money for them. Other data in possession of the author show the contrary to be true. Iowa consolidated schools in towns of less than 500 population are spending \$143 per pupil as against \$86 in the same size towns without consolidation. Not only is this true, but the group of cities in Iowa spending the largest per pupil amount is spending 25 percent less than these same consolidated schools. Incidentally they are doing it at a rate of taxation nearly double that of the consolidated school. The per pupil expenditure in consolidated districts in excess of the per pupil expenditure of towns of similar size is more than enough to pay for this high transportation cost and still employ the same or a better grade of teachers. Nevertheless, the transportation item does seem rather excessive. One can not teach children until they are in school; but it may

be that the bus drivers' salaries approximate or even exceed those of the teachers—a condition which would not be justified by the importance of the service which the drivers render.

The position of debt service in the budgets of the consolidated schools means that these schools are paying more for interest and bonds than they are for the operation of the plant which these bonds have provided for. It means that only two items of expense exceed these payments, namely teachers salaries and transportation. This is perhaps explained by the fact that the consolidated movement is new in Iowa, and that most of the districts therefore, have new buildings to pay for. Aside from the items of transportation and debt service, the budget items of the consolidated schools correspond in rank order to those of the non-consolidated schools having budgets of approximately the same size.

In conclusion, it is the opinion of the author that the figures contained in this article, both for the proportion of municipal expense available for public schools and for the distribution of school expense among the various items, will be rather widely applicable outside of Iowa. There is little reason to suppose that the place of the school in the Iowa town is different from its place in the towns of other states, particularly the midwestern and northern states. And there are many reasons for assuming the internal school practices of Iowa to be very similar to those of her sister states. The figures given are in terms of percents; and the number of cases on which they are based is, with the possible exception of larger cities, sufficient to permit reliable conclusions.

## A COMPARISON OF THE BRIGHTNESS OF COUNTRY AND CITY HIGH-SCHOOL CHILDREN

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### PURPOSE AND METHOD

The results here reported came to light in an investigation whose general purpose was to inquire into the relationship existing between general intelligence, as determined by group mental tests, and the choice of and success in high-school subjects. Comparisons were especially desired between groups choosing vocational subjects and those choosing non-vocational subjects. Pupils having the privilege of electing Latin, Spanish, French, vocational agriculture, home economics, and trades and industries were selected for the tests. A vocational and a non-vocational group were chosen from each school. Tests were made in practically every type of school in Texas, both white and colored, offering electives in the Smith-Hughes vocational subjects and in some non-vocational subject. Some of the non-vocational subjects were offered as electives only in the larger city schools. The fact that the Latin students, for example, were not equally distributed among the different types of schools may account for the high score attained by this group.

Several of the groups were taken from a city system. To offset the city system, however, groups were also chosen from four rural schools located in the open country some distance from the railroad. Groups were likewise included from two small town schools which had, respectively, seven and nine teachers, and were located in towns of about 1,000 inhabitants. The six remaining schools were located in towns somewhat larger, having from twelve to twenty teachers. All of the latter had some kind of college affiliation.

In each case the hearty cooperation of the principal and teachers was first obtained. If they were at all skeptical of the value of mental tests, the school was passed by. The Otis Group

Test, Form A, was used. The test conditions were made as nearly uniform as possible, and the tests were administered strictly according to the procedure prescribed by the author. In making comparison, the Otis\* index of brightness was used. Medians and other values were computed by the methods suggested by Rugg.\*

### RESULTS

It is evident from a study of Table I that the students in the various types of schools differ in intelligence level. For the 164 pupils in city high schools the median index of brightness (I. B.) is 100.5; that is, 0.5 above the norm given by the author. The same table shows the distribution of I. B.'s for the 290 pupils in the six affiliated and classified town schools. It will be seen that a median I. B. of 98 places this group 2.5 points below the median for the city group. The median I. B. for the 59 pupils in the unaffiliated small town schools is 84.4, or 13.6 below that of the affiliated town schools and 16.13 below that of the city schools. Finally, the median of 77 for the rural schools is 23.5 points below that of the city schools.

The gradual decrease in the median I. B., as shown above, indicates that urban pupils are more adept in answering the type of questions found in the Otis tests than are those living under more rural conditions. The results might possibly be invalidated to some extent by the small number of pupils shown. However, it is the opinion of the writer, based upon a long association with the pupils in these types of schools, that the medians would be changed very little if the numbers had been doubled or tripled. If the distributions for the third and fourth groups are combined as one unaffiliated rural-school group, a better distribution curve will result, without changing materially the conclusion reached. The difference can not be due to sex, since the number of boys and girls in each group is approximately equal. Nor can the results be due to the presence of foreign children. The city system and three of the affiliated town schools had, in fact, more than their share of the foreign element. One of the small town

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\* See references at end of article.

TABLE I.—DISTRIBUTIONS OF OTIS INDICES OF BRIGHTNESS IN DIFFERENT TYPES OF HIGH SCHOOLS

TYPE OF SCHOOL	OTIS INDICES OF BRIGHTNESS																	
	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99	100-109	110-119	120-129	130-139	140-149	150-159	160-169	170-179	Median
City high schools (164 cases).....	1	1	1	4	13	21	21	19	20	23	15	11	11	2		1	100.5	
Affiliated town schools (290 cases).....		1	10	17	23	31	31	40	41	37	30	13	7	7	2		98.0	
Unaffiliated small town schools (59 cases).....	1	1	4	4	6	10	8	8	3	9	3	1	1				84.4	
Rural schools (68 cases)...	3		4	5	7	8	10	9	11	1	2	6	2				77.0	

unaffiliated schools and two of the rural schools also had several immigrant pupils. It is clear, therefore, that the results could not have been materially affected from this source.

### CONCLUSIONS

These tests represent as nearly average groups of students in each type of school as it was possible to obtain. This being the case, the conclusion seems to be justified that the country child is lower in general mentality, as measured by the group mental test, than the city child. In a recent study Colvin\* concludes that no group mental test is an absolute measure of general intelligence. He does find, however, that results from the use of the Otis test are closely correlated with a child's ability to succeed in the average high-school subject. Proctor\* and others have reached the same conclusion in similar investigations. The sociologist would perhaps argue that differences in social environment and training account for the fact that the country child is not as well prepared for attaining high marks in this kind of test as his city neighbor; that the test is not a true measure of native ability. It should not be forgotten, however, that for years there has been a steady migration of the country's best to the city. Lincolns come from the rural districts, but they never go back. All of the available evidence points to the conclusion that the mental traits, whatever they may be, which are measured by the Otis group tests, exist to a less degree in the average rural child than in the average child of the city.

Colvin\* further points out in his study of the Otis test that the median scores derived in his investigation are much higher than the norms given by the author. It is evident from the above discussion that the type of school in which the tests were given might easily influence the results.

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## A PRACTICAL COURSE IN HOUSEHOLD CHEMISTRY

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A course in the practical application of chemistry to household problems has been instituted at the Pennsylvania State College during the present school year. The course was planned by the writer with the collaboration of Miss Edith P. Chace, Director of the Department of Home Economics, in this school. For a number of years it had been observed by Miss Chace that the students who went out from this and from other colleges as teachers of home economics in high schools were not as thoroughly familiar as seemed desirable with the actual application of chemistry to the problems of their own field. There was no doubt but that the chemistry which the girls had received was very thorough as far as the subject itself goes. The students in the department of home economics at this school have always been given the same training in inorganic chemistry, in organic chemistry, and in qualitative analysis, as that given to the men who have specialized in the different pure and applied sciences.

That there was something lacking, however, in the training which the girls had received in this subject or that there was something which did not get across to them seemed undoubtedly to be the case. This conclusion was reached as a result of the numerous inquiries from the girls themselves concerning very simple matters which had proved puzzling to them after they had gone into the field of activities. These questions came to Miss Chace through the mails, through personal interviews with the girls, and through round-table discussions, conducted at different institutions and at other gatherings of high-school teachers. All such questions were preserved with the view of arriving at some sort of solution of the difficulty. Quite independently the writer had been led, through criticisms of a similar nature coming from many different quarters, to collect practical questions which chemistry could be made to solve.

From all the different sources, between eight hundred and a thousand such questions were at hand when work on this course was inaugurated. The following group of 25 questions taken from Miss Chace's notes gives an idea of the raw material from which the course developed:

1. What chemical reaction goes on when a person irons clothes?
2. How does soap help in washing dishes?
3. How may all-wool underwear be washed without shrinking?
4. Exactly why should a varnished surface be washed without soap?
5. Why will washing powder soften water?
6. What is meant by a calorie?
7. Why does the application of a mustard plaster relieve pain?
8. How does starch stiffen a man's collar?
9. Why do we find soot on our cooking utensils?
10. Why do one's eyes smart in a room filled with smoke from burning meat?
11. What makes an egg spoil?
12. Why does silverware tarnish?
13. What is mother of vinegar?
14. Why does iron rust appear on improperly rinsed clothes?
15. What is bluing?
16. Why won't dyes for silk and wool color cotton and linen materials?
17. How can one explain the process of oxidation so that the drafts in a stove can be understood?
18. What chemical reaction takes place when home-made soap is made from beef tallow and wood ashes?
19. Why do some commercial stove polishes cause explosions?
20. What kinds of foods give a chemical reaction with aluminum kitchen utensils?
21. To what is the cleaning property of such washing powders as "Gold Dust" and "Pearline" due?
22. What is the composition of face powders and rouges and what is their effect on the skin?
23. Why does bleaching powder sometimes make holes in the garments on which it is used?
24. What is the composition of liquid soaps found in public lavatories?
25. Why does the gas oven sometimes explode when lighted?

The course in household chemistry is planned with a two-fold aim: (1) to supply the mechanical subject matter needed to give the student of home economics a better understanding of such practical questions as arise in other subjects included in the home economics curriculum; and (2) to equip the student for dealing with the chemical problems arising in the activities of an institutional manager, a teacher of household science, or a housewife. Only subject matter, which satisfied needs coming under one or the other of these two aims, was included in the course.

In order to secure a list of those needs which could be classified under the first aim, teachers of housewifery, textiles, and of other subjects of the home economics curriculum, were interviewed and asked this question: "In this course in household chemistry, what specific topics do you wish discussed in order to prepare the students for your own subject?" With reference to the second aim, the questions collected in the manner described above were analyzed and then organized. At first these questions seemed to form a hopeless hodge-podge of non-related topics; but when they were properly classified, it was found that they could be grouped around a few common problems.

The course in household chemistry was placed in the second semester of the sophomore year, because the students by this time had been given one semester's work in each of the subjects, inorganic chemistry, organic chemistry, and qualitative analysis. The problem of the relation of chemistry to the study of foods was planned as a separate course to follow the more general course, and for this reason is not now discussed.

A brief description of the course follows. Under each main problem is given an outline of the sub-problems considered, followed by a brief analysis of the function of this sub-problem to the problem as a whole, together with an explanation of its method of presentation.

#### PROBLEM I.—THE APPLICATION OF CHEMISTRY TO PROBLEMS OF WATER SUPPLY AND WASTE DISPOSAL

1. *A study of the mineral content of typical natural waters.*—In this connection the students analyze samples of water from the town water

supply, first quantitatively in order to determine its total mineral content, and second qualitatively in order to find out the nature of the mineral matter contained in the water. By consulting published data on the mineral content of typical natural waters, the student makes comparisons between the water analyzed and other typical waters.

2. *A study of hard water.*—

(a) Lecture demonstrations are given to show the type of mineral matter which causes water to possess the property of hardness. The types of mineral matter causing hardness which is capable of being relieved by boiling and that type which can only be relieved by the addition of certain reagents are demonstrated. The effect of hardness of water on such domestic operations as laundry work and dyeing, as well as the effect on the amount of soap used for toilet purposes is brought out by lecture and demonstrations.

(b) Laboratory determinations of a quantitative nature are performed by each student in order to determine (1) the soap-lathering ability of soft compared with different types of hard waters, (2) the soap-lathering ability of one certain hard water after it has been softened with washing soda, with borax, and with typical commercial washing powders. From the latter study the comparative cost of softening water with soap and with the different agents used is calculated by each student.

(c) Lecture demonstrations are given to show how hardness of water affects certain industrial operations, the Permutite process for softening water on a commercial scale being demonstrated, and an explanation being given of the application of the above laboratory methods of water-softening on a commercial scale. The possibility of softening water on a large scale for uses in hotels, boarding schools, etc., is also discussed in a lecture.

3. *The purification of water for drinking purposes.*—

(a) By lecture-demonstration methods the common types of impurities present in typical waters used for drinking purposes are presented together with a means of removing these impurities, (1) if the problem is one which has to be solved by each individual household, and (2) if the problem is to be undertaken by the community as a whole.

(b) Students prepare a filter which can be used for domestic purposes. Students also perform laboratory experiments which show the processes of filtration, coagulation by the addition of chemicals, addition of disinfectants, etc.

(c) Students are asked to assume that they are serving on some sort of a committee which is investigating conditions having to do with water purification. Some students are asked to assume that they live in a large city which derives its water supply from a certain river; other students are placed in different types of localities, the water supply coming from various sources. Each student is then permitted to study

the problem and to present a report to the entire class, the report covering the findings of her particular committee with regard to the best type of water purification to be undertaken under the particular conditions assumed.

4. *The study of waste disposal.*—

(a) A lecture on the subject of garbage disposal is given for the purpose of explaining correct and incorrect methods of garbage disposal, (1) if the problem is left to the devices of each household, (2) if the problem is in the hands of municipal authorities. Ordinances from the municipal statutes of various cities are read and discussed. The two methods practiced in different communities (namely, disposal of all waste by completely destroying everything collected, and recovery of such material as can be put to use) is a topic selected for a brief debate conducted by members of the class, the instructor judging as to which side presents the better argument.

(b) A lecture is given on sewage disposal, the chemistry of nitrification and putrefaction being presented with a view to determining which of the methods in common use in different typical homes are conducive to the proper chemical reaction.

(c) The students are taken on a tour of inspection through the city sewage disposal plant.

(d) With the help obtained from the above trip and from lecture discussions, each student draws plans for a sewage disposal system for an individual home, different types of homes being assigned to the different students so that a correct solution of the problem for a family of means as well as for a family of very limited means may be discussed.

**PROBLEM II.—THE CHEMISTRY OF CLEANSING AND POLISHING AGENTS**

1. *Chemistry in soap making and in the process of cleaning.*—

(a) A lecture is given on the history of the soap industry, the composition of soap, and the means of manufacturing a typical laundry and a typical toilet soap.

(b) Students are presented with about twenty trade formulas for soap making, these formulas having been modified and reduced to laboratory proportions. They write the formulas for the fats used in each case, and the equations for the saponification reaction which takes place in ten of the examples. Each student then selects one of the formulas, prepares the soap in the laboratory, and assumes that she is going to place the soap on the market. Acting under this assumption, she gives the soap a trade name, describes the purpose for which it can be used, and writes an advertisement for its sale. When this exercise is completed, the student should know the composition of soaps for various purposes.

(c) The various theories concerning the action of soap on grease and dirt are presented to the student in lectures.

**2. Detergents in general.—**

(a) Farmers' Bulletin Number 861, issued by the United States Department of Agriculture, is used as the basis for this study. The reason for selecting this bulletin is the fact that it is used in this school as the basis for the study of detergents in the housewifery class, and also the fact that this bulletin is in common use among housewives. Students are given samples of different kinds and colors of cloth with the kinds of stains commonly met with in actual practice. They determine by experiment the best reagent to apply for the removal of the stain in each case. This work is supplemented by lecture work on the composition of the stains and on the chemical action involved in their removal. Students in reporting on their laboratory work, present mounted samples showing the effects of the different treatments, together with an account of whether the reaction in each case was one of chemical change, or whether it was due to the solvent action of the agent applied, etc.

(b) Furniture, stove, metal, and shoe polishes are studied in laboratory supplemented by lecture explanations. Students are presented with typical formulas used for making polishes of each of these kinds. Each student selects one formula in each case, prepares a small sample of the product in the laboratory, applies the polish to the type of article for which it is intended, and then writes a brief account of the purpose of each constituent in the polish.

**PROBLEM III.—THE CHEMISTRY OF FUELS**

1. *Heat of combustion.*—A lecture is given on the subject of "Heat of Chemical Reaction" for the purpose of explaining the meaning of "Heat of Combustion" with reference to fuels.

2. *A study of coal.*—A laboratory demonstration is given by the instructor to demonstrate the use of the Bomb Calorimeter and of the Parr Calorimeter; this demonstration being followed by a discussion of the subject, "Buying Coal on Specification." This is followed by a consideration of various plans for applying the commercial methods of testing coal to the testing of coal for the benefit of the private consumer.

3. *A study of gaseous fuels.*—

(a) Natural gas. The bulletins issued by the Bureau of Mines are used as a basis for the study of natural gas. The following topics are discussed in a demonstrated lecture: composition of natural gas, reasons for its high calorific value, means of securing its complete combustion in a gas stove as a means of conservation.

(b) Coal gas. Each student prepares coal gas in the laboratory. She is given a problem on the comparative cost of various fuels, based on their cost and calorific values. The advantages and disadvantages of the different fuels in respects other than calorific value are discussed. The object of this mathematical problem with the supplementary

discussion is to show the factors which should be taken into consideration in selecting a fuel for a certain purpose.

(c) Acetylene. Each student prepares Acetylene in the laboratory. She draws a diagram of a possible Acetylene system for a country home.

4. *"Canned heat."*—In response to numerous inquiries concerning the composition of various trade products coming under this head, each student is given a copy of a practical formula for the preparation of "Solid Alcohol" and is permitted to prepare a sample of the product in the laboratory.

#### PROBLEM IV.—THE APPLICATION OF CHEMISTRY TO MEANS OF PREVENTING AND EXTINGUISHING FIRES

1. *The causes of fires.*—Students are assigned reading material supplemented by a lecture on causes of fires, prevention of fires, and spontaneous combustion, and by a discussion of the regulations of fire insurance companies.

2. *The prevention of fires.*—Students perform laboratory experiments on (a) the preparation of carbon dioxide and its properties, (b) the properties of carbon tetrachloride, and (c) the properties of fusible alloys, such as Wood's Metal. The purpose of these exercises is to form a basis for the demonstration on fire extinguishing devices which follows.

3. *Fire extinguishers.*—Demonstrations are given by the instructor to show the structure of the two most common types of domestic fire extinguishers; namely, those of the Pyrene type, and those of the carbon dioxide type. This is followed by demonstration to show the value of these two types of extinguishers in putting out bonfires. The structure and principle of "sprinkler systems" and systems which have automatic fire alarm devices are presented by lecture and demonstration.

#### PROBLEM V.—THE APPLICATION OF CHEMISTRY TO A STUDY OF PAINTS, VARNISHES, AND LACQUERS

1. A lecture is given to show the composition of a typical mixed paint, the function of each part of the paint being given. A brief description of the Old Dutch Process for making white lead is given in this connection.

2. Each student performs a laboratory study of the composition and properties of linseed oil and of metallic soaps with the purpose of determining their value in paints.

3. In the laboratory each student prepares ten pigments, methods of precipitation being used. Each student writes the equation for the reactions in each case, mixes the pigment according to instructions given, and applies the paint to squares of wood or to some wooden

object which the student wishes to paint. The purpose of this study is to show the composition of various colored pigments.

4. A classroom discussion is held on the subject of the kinds of paint to use, and the kinds not to use in various places. The warnings given in the bulletin issued by the United States Department of Agriculture on the subject of what paints to use on various farm buildings forms the basis for the discussion, the chemical reactions involved in each case being presented.

5. A lecture is given on the composition of ordinary varnishes, of water-proof varnishes, of lacquers, and of luminous paints. This is followed by a laboratory exercise in which each student prepares one varnish and one lacquer from formulas supplied by the instructor, applying the product prepared in each case to a suitable surface, and writing a brief description of the function of each ingredient.

#### PROBLEM VI.—THE APPLICATION OF CHEMISTRY TO THE SILICATE INDUSTRIES

1. A lecture is given on the scope of the silicate industries and their importance to the housewife. This lecture covers the composition of clays in general, the reactions which take place in nature with the formation of clays, the variation of the composition of clays used for making various articles such as dishes, bricks, potteryware, terra-cotta, and porcelainware.

2. A laboratory exercise is given each student on the preparation and use of a cement for mending broken dishes. This is given at the request of the instructor in housewifery.

3. A lecture is given on the composition and chemistry of Portland Cement. This is accompanied by a demonstration on the methods in use in commercial practice for testing the qualities of a cement block. The purpose of this demonstration is to show the qualities desired when cement is purchased according to specification.

4. A lecture is given on glass manufacture including a discussion of the composition of glass, the reactions taking place in its manufacture, the composition of different types of glass, etc.

5. Students are given simple laboratory exercises in glass-blowing, the purpose being to exemplify more complicated commercial methods.

6. Each student prepares a series of colored glass beads, the purpose being to show the composition of various types of colored glass.

#### PROBLEM VII.—THE APPLICATION OF CHEMISTRY TO A STUDY OF THE COMPOSITION AND IDENTIFICATION OF TEXTILE FIBERS

1. A lecture is given on the composition of typical fibers which are used for making fabrics.

2. Laboratory exercises are performed by each student on the microscopic identification of such fibers as wool, silk, cotton, shoddy,

wild silk, artificial silk, and linen. In this connection stress is laid on the simpler tests which might easily be used in the home. This last study covers simple differentiation tests for the fibers which are commonly substituted for one another in commerce, such as wool-cotton, silk-cotton, silk-wild silk, silk-artificial silk, linen-cotton.

3. A lecture is given covering the subjects of mercerization, dressing and weighting, water-proofing of textile fabrics, and fire-proofing of textile fabrics.

4. Each student performs a quantitative determination on a wool-cotton or a silk-cotton mixture in order to determine the percentage of weighting and the percentage of cotton present. By exchanging ideas as to the results obtained on various typical samples, each student obtains some idea of the composition of typical textile fabrics on the market.

#### PROBLEM VIII.—THE APPLICATION OF CHEMISTRY TO DYEING AND BLEACHING PROCESSES

1. *Natural dyes*.—A lecture is given on the history of the dye industry until 1856, the time of the discovery of the first synthetic dye. This covers the use of Tyrian purple, alizarin, indigo, tumeric, cochineal, and logwood, as well as some of the old mineral dyes, such as iron buff, of our Colonial ancestors.

2. *Synthetic dyes*.—

(a) Students prepare aniline blue in the laboratory, the purpose being to give them an idea of the general methods of preparing synthetic dyes.

(b) A lecture is given on the coal-tar dye industry, the preparation of aniline dye by the students being used as a basis for the discussion as to the general methods employed commercially for building up in the laboratory a large number of dyes.

3. *Mineral dyes*.—Students prepare ten typical mineral dyes, and write all chemical reactions involved.

4. *Classification of dyes according to method of application*.—Students perform laboratory experiments on dyeing actual fabrics with typical direct dyes. These are usually applicable to woolens and silks, but not to cotton materials. Students apply dyes which require a mordant, the chemistry of the action being presented in each case. These typical laboratory experiments which each student performs are made the basis for a class-room discussion of the chemistry of various common dyes used in home dyeing processes.

5. *Bleaching*.—A laboratory exercise on bleaching of raw textile fibers, as well as the bleaching of textile fabrics, which have been dyed with organic dyes, and of those which have been dyed with mineral dyes, is given. The first portion of the exercise is given to satisfy a request

from the textile department that we show commercial methods of bleaching raw materials in their process of manufacture. The second portion is given for the two-fold purpose of showing the student, first, that certain bleaching agents applied for the purpose of removing stains can not be applied to materials dyed with certain types of dyes, and second, that faded dresses are sometimes capable of being bleached white.

#### PROBLEM IX.—THE APPLICATION OF CHEMISTRY TO A STUDY OF TOILET PREPARATIONS

This problem is the result of requests from students concerning the composition of various toilet preparations. Its incorporation in this course was heartily indorsed by the members of the home economics department, especially since the American woman is spending each year more money on preparations of this kind.

1. A lecture is given on the composition of typical toilet preparations such as face powders, face creams, freckle creams, manicure preparations, depilatory powders, tooth powders and pastes, foot powders, perfumes, and hair preparations.
2. In the laboratory each student is permitted to make five toilet preparations in which she is particularly interested, a group of formulas for each of the preparations, outlined in the lecture, being on file in the laboratory. The student reports on each product, outlining the use of each constituent, and showing the exact cost at current market prices of the material as prepared.
3. A lecture is given on the injurious materials sometimes used in toilet preparations. Students are given references to read on this subject; and they are then given samples of commercial products to test for the presence of injurious ingredients.

#### PROBLEM X.—THE APPLICATION OF CHEMISTRY TO A STUDY OF SIMPLE REMEDIES

1. Two lectures are given on the composition, the properties, and the effect on the human organism of common medicines such as quinine, aspirin, acetanilide, castor oil, herb tablets, sal hepatica, common blood medicines, and tonics.

The composition of various patent medicines, with a warning against the use of some of them, is brought out.

2. Students make simple tests for quinine, iron compounds, etc., for the purpose of applying these tests to a few common patent medicines in order to determine their composition.

3. A lecture is given on the subject of "Poisons and Their Antidotes." The entire purpose of this is to make clear the chemistry involved in the action of the antidotes which should be administered for poisons.

## LOST IN CONCRETE INSTANCES—MANY LEARNERS

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The average teacher assumes, when he gives one or two concrete instances involving a certain principle, that the learner is pretty sure to get the principle involved. In demonstrating modes of procedure in the administration of intelligence tests this assumption is placed on trial.

Because about 25 percent of the men of the National Army did not have adequate schooling to enable them to take the Alpha test for literates they were given a non-verbal test (Beta), each part of which was demonstrated practically without language. Before each part of the test was tried by the men, problems were presented on a large chart illustrating the principles involved in that part of the test. These problems were solved in pantomime by an assistant after aid had been given in pantomime by the examiner (or demonstrator). Following such demonstration the soldiers were started to work at the problems of the part of the test which had thus been demonstrated. For example, the second exercise of Beta requires that the soldier indicate in written figures below each group of drawn cubes, the number of cubes represented by the drawing of that group. These groups grow successively harder from the first to the last on the page. The demonstrator first presents the actual cubes which he counts in pantomime and then associates by gesture with the same kind of a group of blocks drawn on a chart. Below this group of three blocks he signals, by pantomime, to his assistant to write the figure 3, meaning "three blocks in the picture." Several more difficult groups of cubical drawings are thus counted in pantomime, after which the soldiers are signaled to go ahead and count the blocks in like manner in all groups of cube-drawings on their test page.

To what degree did the principles thus involved get across? Soon after the signing of the Armistice, and before the Psycho-

logical Board at Camp A. A. Humphries was dissolved, the writer with the aid of several enlisted men of that Board studied this problem in respect to the Beta papers of 1466 men. It was found that 453 men, or 31 percent, wrote the figure 3 under the picture group of two cubes, the first problem, evidently because in the demonstration the first picture group represented three cubes. In other words, about a third of the men failed wholly to grasp the principle involved. They merely repeated a concrete instance by imitation.

*Is this failure to get the principle involved from the several concrete instances an index of a low grade in intelligence rating? Is suggestibility as manifested by the 31 percent an indication of their low intelligence?*

The Beta letter ratings from the highest to the lowest grades are A, B, C+, C, C-, D, D-. Now, of these 453 men who failed on the first simple problem of counting two blocks, 76 percent got D or D- in total Beta. Only 3 percent got above C. On the other hand, of the remaining 1013 men who did not write the figure 3 (but who wrote 2 as it should be) under the drawing group of two cubes, only 53 percent got D or D- in total Beta and 17 percent got above C.

Similarly, the principles of Test III in Beta were so demonstrated in the first step that the experimenter directed his assistant, by pantomime, to place O's in the empty squares on the chart that followed a series of squares already filled with O's. In the first test problem of the soldier's blank was a similar row, but with a series of X's instead of O's. Instead of supplying these omitted X's many of the men copied from memory the O's as they had seen them in the chart demonstration. Four hundred and three men, or 27 percent of the 1466 men, thus supplied zeros instead of X's. Of these, 84 percent received D or D- and only 2 percent got above C- in total Beta rating. Of the remaining 1063 men, only 51 percent got D or D- and 21 percent got above C.

From this one may conclude that those who failed to get the principle involved in this simple demonstration but who gave

evidence of a kind of naïve memory (perseveration) were more often relatively inferior men in Beta than those who did resist the tendency to imitate the demonstrator and who did grasp the principle.

This surprisingly strong tendency blindly to reproduce definite concrete data instead of grasping the principle involved suggests a danger in the present emphasis on the "concrete in education." While the concrete is the indispensable avenue to abstractions, there is no assurance that the learner will ever arrive at a general idea or principle just because he is on this avenue. The average lecturer, preacher, textbook writer, and teacher assumes that with appropriate concrete data presented in a certain sequence the desired abstraction will inevitably follow. There is a strong tendency for teachers and textbook writers who are eager to simplify the lesson to turn definitions into concrete instances or to substitute the latter for the former. Such teachers present facts in that fashion. Thus habitually they may answer questions by the pupils and accept answers from pupils entirely in terms of one or two similar concrete instances. Let it be remembered that, by the mere law of association and because of human laziness, when several instances are given, there is a strong likelihood that the instances will be similar and not, in the mind of the learner, necessarily representative of the possible varieties of examples of the principle involved.

The instances *per se* are not in error. They are often an indispensable asset; but the danger lies in stopping with them. There must be a surety that the learner actually arrives at the principle involved and that the concrete instances do not become the mere object of his interest, the actual end in itself, instead of a symbolizing means to that end.

To his chagrin the writer has frequently discovered, after numerous concrete instances had been elicited from various members of his class in introductory psychology illustrative of a principle which the writer felt certain the class all had in mind, that few or none of the class really had seen the principle involved. They had merely been gathering instances by means of "that-reminds-me" process.

If the wide activity in visual education is to realize its purpose, this problem must be taken into account. Otherwise, not only will the concrete data serve as a temporary distraction from the desired general ideas and principles involved, but also the learner by such continuous appeals will develop habits and attitudes of responses to specific situations independent of the principles they symbolize, which will inevitably carry over or transfer *ad libitum*. Grave dangers certainly there are, then, that the learner will be lost in concrete instances.

The effectual teacher is one who constantly appeals through the concrete to the principle involved, *but who never fails to lead the learner always to arrive in safety at that principle.*

## A METHOD OF COMMENSURATING MENTAL MEASUREMENTS

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### I.—THE KENTAL PRINCIPLE

A problem that is always present with those concerned with the measuring of mental and social phenomena is that of reducing to common terms quantities stated in terms of incommensurate units. To use a simple illustration, how may a subject's performance in a test of attention and his performance in a test of perception be reduced to terms that make precise comparison possible? Clearly, the crossing of the letter 'A' in the one case bears no manifest numerical relation to the addition of integers in the other. A new and serviceable method of effecting such commensuration will doubtless be of some interest to investigators.

The device ordinarily employed in biological studies to effect commensuration is the Galton percentile, which furnishes a method of comparing the performances of subjects in a series of tests. The method herewith suggested will, I believe, be found superior in point of accuracy and adaptability to the purposes of educational measurement. The unit of the system has been named the *kental*.<sup>1</sup> A comparative demonstration of the two methods will serve to bring out their theoretical differences.

Tables I and II record the performances of two groups of subjects, U, a group from cities, and V, a group from villages, on two tests—Table I for the 'A' test of attention,<sup>2</sup> and Table II for the simultaneous adding test of perception. In these tables the third group, C, combines the groups U and V. Column S records the original scores of the subjects; column P gives their percentile; and column K their kental equivalents. The percentile, of course, represents the rank of a subject's performance in

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<sup>1</sup> Adapted from the Latin *centum*.

<sup>2</sup> See Whipple: *Mental and Physical Tests*, Vol. 1, p. 305.

the series, expressed in percentage terms, the position of the highest score furnishing the base of computation. Thus, in a group of fifty, the subject who ranked first would be given a percentile rating of 100 because he was one hundred percent removed from the position of the lowest rank; the subject ranking tenth would be given a percentile rating of 80 because he was eighty percent removed from the position of lowest rank. In strict accuracy, these values should read 99.5 and 79.5, for in a group of one hundred the chances are even that the performance would be ranked 99 or 100, 79 or 80.

The kental equivalent of a measurement is obtained in an altogether different manner. The essential steps in the process are:

1. Determine the *range* of values represented in a given given series of measurements. This is done by subtracting the lowest score from the highest.
2. Determine the *elevation* of each measurement in the series by subtracting from it the lowest score.
3. Express these elevations as percents of the range.

Here is a simple illustration of this procedure. Let the highest score be 150, the lowest, 75, and the given score be 120. The range will be  $150 - 75$ , or 75. The elevation of 120 is  $120 - 75$ , or 45. Reduced to a percent of the range 75, 45 becomes 60, which is the kental transversion of the measurement 120.

It may appear that the base of the kental unit might better be the span of the first and third quartiles or the first and ninth deciles rather than the extreme margins<sup>8</sup> of the total range. This would, of course, give greater invariability to the standard range inasmuch as the extreme marginal variables would be eliminated. A range determined for a given test from a standard group in one laboratory might more nearly be supposed to be equal to the ranges for other tests determined from groups in other laboratories. The practical effect of this would be to introduce the 100+ transversion for all scores above the third quartile or the

<sup>8</sup> "Margin" is here used as in economics to designate the items of extreme variation.

TABLE I.—PERCENTILE AND KENTAL EQUIVALENTS OF MENTAL MEASUREMENTS. SIMULTANEOUS ADDING TEST OF PERCEPTION

Key: U = urban group of subjects; V = village group; C = urban and village groups combined; S = original measurements or scores of subjects; P = their percentile equivalents; K = their Kental equivalents; M = median; Q<sub>u</sub> = upper quartile; Q<sub>l</sub> = lower quartile.

Sub- ject	C.			U.			V.		
	S.	P.	K.	S.	P.	K.	S.	P.	K.
1	419	100.0	100.0	419	100.0	100.0			
2	384	97.4	83.9				384	97.4	83.9
3	378	94.9	81.1	378	94.9	81.1			
4	372	92.3	78.4	372	92.3	78.4			
5	370	89.7	77.5				370	89.7	77.5
6	368	87.2	76.6	368	87.2	76.6			
7	365	84.6	75.2				365	84.6	75.2
8	362	82.0	73.9	362	82.0	73.9			
9	361	79.5	73.4	361	79.5	73.4			
10	353	76.9	69.8				353	76.9	69.8
11	348	74.4	67.5				348	74.4	67.5
12	341	71.8	64.3	341	71.8	64.3			
13	338	69.2	62.9				338	69.2	62.9
14	333	66.7	60.6	333	66.7	60.6			
15	332	64.1	60.2	332	64.1	60.2			
16	331	61.5	59.7	331	61.5	59.7			
17	324	59.0	56.5				324	59.0	56.5
18	323	56.4	56.1	323	56.4	56.1			
19	320	53.9	54.8				320	53.9	54.8
20	318	51.3	53.9	318	51.3	53.9			
21	310	48.8	50.2	310	48.8	50.2			
22	306	46.2	48.3	306	46.2	48.3			
23	300	43.6	45.6	300	43.6	45.6			
24	295	39.7	43.4				295	39.7	43.4
25	295	39.7	43.4				295	39.7	43.4
26	294	35.9	42.9				294	35.9	42.9
27	290	33.3	41.0				290	33.3	41.0
28	280	30.8	36.5	280	30.8	36.5			
29	277	26.9	35.1	277	26.9	35.1			
30	277	26.9	35.1				277	26.9	35.1
31	276	23.1	34.7				276	23.1	34.7
32	271	20.6	32.4				271	20.6	32.4
33	258	16.7	26.5	258	16.7	26.5			
34	258	16.7	26.5				258	16.7	26.5
35	255	12.8	25.1				255	12.8	25.1
36	226	10.2	11.9				226	10.2	11.9
37	212	7.7	5.5	212	7.7	5.5			
38	208	5.1	3.6				208	5.1	3.6
39	200	2.6	0.0	200	2.6	0.0			
Q <sub>u</sub> ....	353	76.9	69.8	362	81.4	73.8	348	74.4	67.5
M....	318	51.3	53.9	327	58.9	57.9	295	39.7	43.4
Q <sub>l</sub> ....	277	26.9	35.1	285	34.0	38.8	271	20.6	32.4

TABLE II.—PERCENTILE AND KENTAL EQUIVALENTS OF MENTAL MEASUREMENTS. A-TEST OF ATTENTION

Sub- ject	C.			U.			V.		
	S.	P.	K.	S.	P.	K.	S.	P.	K.
1	106	100.0	100.0	106	100.0	100.0			
2	105	97.2	97.3				105	97.2	97.3
3	103	94.5	95.9	103	94.5	95.9			
4	101	91.8	93.2	101	91.8	93.2			
5	99	87.8	90.4	99	87.8	90.4			
6	99	87.8	90.4	99	87.8	90.4			
7	98	83.8	89.0	98	83.8	89.0			
8	95	81.1	84.9				95	81.1	84.9
9	94	78.4	83.6				94	78.4	83.6
10	93	75.7	82.2	93	75.7	82.2			
11	92	71.6	80.8	92	71.6	80.8			
12	92	71.6	80.8	92	71.6	80.8			
13	91	67.6	79.5	91	67.6	79.5			
14	89	64.9	76.8				89	64.9	76.8
15	87	62.2	74.0				87	62.2	74.0
16	82	59.4	67.1				82	59.4	67.1
17	81	56.8	65.8				81	56.8	65.8
18	80	52.7	64.4				80	52.7	64.4
19	80	52.7	64.4				80	52.7	64.4
20	78	48.6	61.6	78	48.6	61.6			
21	77	44.6	60.3	77	44.6	60.3			
22	77	44.6	60.3				77	44.6	60.3
23	76	40.5	58.9	76	40.5	58.9			
24	74	37.8	56.2				74	37.8	56.2
25	73	35.1	54.8	73	35.1	54.8			
26	72	32.4	53.4				72	32.4	53.4
27	70	28.4	50.7				70	28.4	50.7
28	70	28.4	50.7				70	28.4	50.7
29	66	24.3	45.2	66	24.3	45.2			
30	63	21.6	41.1				63	21.6	41.1
31	62	18.9	39.7	62	18.9	39.7			
32	60	14.9	37.0	60	14.9	37.0			
33	60	14.9	37.0				60	14.9	37.0
34	57	10.8	31.9				57	10.8	31.9
35	50	8.1	23.3	50	8.1	23.3			
36	40	5.4	9.6				40	5.4	9.6
37	33	2.7	0.0				33	2.7	0.0
Q <sub>s</sub> ....	93.5	79.7	92.9	99.0	87.8	90.4	87.0	62.2	74.0
M....	80.0	52.7	64.4	91.5	69.6	80.1	77.0	44.6	60.3
Q <sub>1</sub> ....	69	26.3	47.9	71.2	32.4	52.4	63.0	21.6	41.1

ninth decile, as the case might be, and the 0—transversion for all scores below the first quartile or the first decile. Thus, in Table I, if the quartiles instead of the margins determined the range, it would be 76 instead of 219. The kental equivalent of the score 419 would be 187, and the equivalent of the score 200 would be —101. In the practical application of the kental, these minus scores might be mistakenly interpreted by inexperienced workers to signify negative quality.

The underlying assumption of the kental method is that *the range of ability obtaining within a sufficiently large group of subjects conforming to given standards of age, sex, physical and mental condition, race, social status, and educational advantage is constant enough to serve as a standard unit for the measurement of mental abilities.* In other words, this is to say that mental abilities within social groups vary only within definite limits. This is but a special case of the general biological principle of the limitation of variation within the species. If the trait of intelligence can vary only within definite limits, then our measurements of the trait can vary by no wider interval.

It may be argued that while the kental method may serve to overcome difficulties in measurement due solely to the incommensurateness of the units of measurement, it still fails to reduce measurements of dissimilar processes to common terms. The assumed equivalence in range of all mental processes, it may be said, is fallacious by analogy with variations of other physical processes. Individual variations in height, for example, are by no means equal to variations in weight, and variations in cephalic index are by no means the same as variations in girth of chest. Therefore, the normal range of memory capacity, for example, may not be held to be equal to range in judgment capacity.

There are two replies that may be made to this line of argument. In the first place, it must be noted that inequality in range of mental processes is just as much an assumption as equality. Having units of measurement that enable us to measure physical traits in common terms, we can say definitely that differences

in variability exist. Lacking such units for the measurement of mental traits, we cannot speak with such finality in this field. Secondly, is it not fair to hold that a difference of 1 mm. in head circumference is more significant than a difference of 1 mm. in chest girth? The kental method aims to measure variations by percents. On this basis, a one percent variation in head circumference might be held to be equivalent to a one percent variation in girth of chest, and a one percent variation in memory

TABLE III.—QUARTILE COEFFICIENTS OF DISPERSION (Q.D.) AND SKEWNESS (Q.J.) FOR GROUP C OF TABLES I AND II

	C-I			C-II.		
	S.	P.	K.	S.	P.	K.
Q. D. ....	.12	.48	.33	.15	.50	.32
Q. J. ....	-.07	.02	-.08	.10	.01	.27

capacity might be held equivalent to a one percent variation in judgment capacity. From a functional point of view, mental processes are at least as much alike in kind as such traits as cranial and thoracic circumference and therefore as comparable.

A point that is to be specially noted in the comparison of the kental with the percentile method of commensuration is that the kental may be given a fixed unitary value by standardizing the minimum and maximum scores marking the limits of the range for all tests in general use.<sup>4</sup> The percentile can not be standardized in this way because its value is based on rank or position in series merely, without reference to the absolute value of the measurement for which it is the equivalent. Thus, in Table I any constant might be added to or subtracted from the values under S without altering the values under P. Indeed, any increase or decrease of the values under S that did not alter their position in the series, no matter how much their quantitative relations might be disturbed, would have no effect on the values

<sup>4</sup> Scores near the margins of the series may be used to designate the limits of the range if the margins themselves vary widely from the general tendency of the dispersion.

under P. On the other hand, any change in the quantity of the values under S would be accurately registered under K.

In statistical terminology we may say that measurements of dispersion and skewness for a kental transversion of a series of values vary with measurements of dispersion and skewness for the original series. This means that we may obtain directly from a kental series coefficients of dispersion and skewness which will be as valid for comparative purposes as are similar coefficients derived from the original series. Table III gives the quartile coefficients of dispersion and skewness for the original scores and their percentile and kental transversions. It will be noticed that the coefficients derived from the percentile series do not measure either dispersion or skewness. This is due to the fact that percentiles indicate *rank* in series merely. Hence the intervals between the items of any percentile series are always equal and the distribution graph of such a series is always a straight line. Theoretically, the coefficient of dispersion of such a distribution is 0.5, and the coefficient of skewness 0. The slight variations from these theoretical norms noticeable under P in Table III are due to the small error incidental to the manipulation of figures.

All this clearly indicates the relatively greater accuracy of the kental as against the percentile method. It follows then that percentiles are less adaptable to the purposes of social measurement than are kentals. Obviously,  $34p$  deduced from one series of measurements may stand for a performance that is markedly different from a  $34p$  performance deduced from a different series of measurements. On the other hand, given the standardization suggested,  $34k$  will always stand for the same degree of ability in subjects tested.

The kental is defined as *the unitary value attaching to the one-hundredth subdivision of the standard normal range of ability for any standard mental test*. Where large numbers of measurements are to be transverted into kentals, the scores may be arranged in the form of a frequency table with one hundred classes, the class interval being one-hundredth of the range of

scores. The number of a given class may then be assigned as the kental equivalent of all scores entered in that class. Thus, if the range were 250, the class interval would be 2.5. Suppose the limits of the 82nd class to be 90 and 92.5. Then all scores above 90 and not exceeding 92.5 would be given a rating of  $82k$ .

The exactness of the results to be obtained by the method herein described will be dependent on the instrumental precision of the tests employed in making the original measurements. If measurements obtained from the application of tests S and T are to be commensurated, and S represents a very refined measurement of a given process, while T is only a rough approximation to such a degree of accuracy, then clearly the chances are that the range of ability exhibited by the results from S will be greater or less than the range of ability exhibited by the T measurements; and the  $100k$  and the  $ok$  measurements for the two tests represent degrees of ability that vary with the precision of the tests used. Granted equal instrumental precision for all tests employed,  $nk$  always stands for equivalence of ability.

Strict accuracy in the commensuration of measurements would further require that the processes measured be of the same value as factors in intelligence. A  $100k$  performance for a test of attention would not necessarily be taken to signify adaptive capacity identical with that of a  $100k$  performance for a difficult test of judgment; but merely that in each case the performance denoted maximal ability. However, the evaluation of mental processes as adaptive and the rating of tests with respect to instrumental precision are problems of experimentation and not of commensuration. Hence, while they enter into the consideration of the usefulness of the kental unit, they do not at all affect its theoretical validity.

## II.—THE COEFFICIENT OF LEARNING

Let us now consider an application of the kental principle to the problem of educational measurement. In Table IV-A have been recorded the results of a study of seventh-grade pupils in a large city where educational research has been well organized.

All pupils were divided into six classes on the basis of their intelligence scores. The medians for these six classes have been recorded in column M.I. The upper and lower limits of the range have been parenthesized. Columns A., R.C., and L. record the median scores attained by the subjects in the six intelligence classes in tests of ability in arithmetic, reading comprehension, and language. The obvious value of such a table is to bring into prominence the relation between intellectual capacity and attainment in learning. If this relation can be reduced to the form of a numerical ratio, we shall have a real index of learning efficiency.

From Table IV-A it is evident that the practical results of instruction do not correlate one hundred percent with the potentialities of the group as indicated by measurements of intelligence. Some classes are obviously doing better than others for the intellectual capital they possess. Striking differences in degree of

TABLE IV.—MEDIAN SCORES OF INTELLIGENCE CLASSES FOR  
SEVENTH-GRADE PUPILS

Key: M.I. = intelligence scores; A = arithmetic scores; R.C. = reading comprehension scores; L = language scores. Scores in parentheses are individual scores marking the upper and lower limits of the range.

A. ORIGINAL SCORES.				B. KENTAL TRANSVERSIONS			
M. I.	A.	R. C.	L.	M. I.	A.	R. C.	L.
(90)	(8.0)	(37.0)	(26.7)	(100)	(100)	(100)	(100)
86	7.0	32.3	21.1	.91	.80	.79	.67
75	6.6	26.8	18.8	.68	.72	.56	.54
69	6.1	23.8	16.7	.55	.62	.43	.41
65	5.1	23.6	15.8	.47	.42	.42	.36
56	5.1	21.5	14.0	.28	.42	.33	.26
48	4.6	18.0	13.8	.11	.32	.14	.25
(42.5)	(3.0)	(13.6)	(9.5)	(0)	(0)	(0)	(0)

correspondence between intelligence and attainment are brought out by comparing the ratio of the intervals between medians for the intelligence series with the ratio of corresponding intervals between medians for the attainment series. Thus the ratio of the interval between the first and second intelligence classes to the

interval between the second and third intelligence classes is observed to be 11:6, while the corresponding ratio for the arithmetic series is 4:5. But while it is clear that there is relatively closer agreement between attainment and intelligence in some classes than in others, the exact degree of correspondence is obviously difficult to state. Table IV-B facilitates comparison by giving kental equivalents for the original scores. However, before discussing the use that is made of these attainment equivalents, it is necessary to justify the validity of the kental method in effecting such transversions.

If there were a correlation of one hundred percent between intelligence and educational attainment, we should be justified in holding the range of ability measured by the marginal intelligence scores to be identical with the range of ability measured by the marginal attainment scores. The ratio of a subject's attainment score to his intelligence score would then give us the learning efficiency of the subject, which, in the case assumed, would be one hundred percent. But, owing to the vicissitudes of class instruction and other factors conditioning learning, we do not get a correlation of one hundred percent between intelligence and attainment, as the results of Table IV have shown us. Statistical studies generally, however, have shown a rather high correlation between native intelligence and ability to learn. This suggests a rather close approximation between the ranges of intelligence and attainment, and gives us warrant for assuming, as a working hypothesis, their equivalence as units for the measurement of ability.

The main objection that is likely to be raised against the kental transversion of attainment measurements is the lack of an adequate logical justification for the assumed equivalence of ranges for attainment tests. While the constancy of the factors conditioning general intelligence, on the one hand, it may be said, may warrant us in assuming equivalence of range for a series of such tests, the variability of the factors conditioning learning, on the other hand, obliges us to concede the unequivalence of range in the case of attainment tests. For example, if the instructional

methods under which two groups of subjects have been schooled show a tendency for the one to favor the superior student and the other the inferior, the range of the results for any given test, as arithmetic, will vary in the two cases. Where the method favors the superior student, the range will be greater than where it favors the inferior. The difference in range is here discoverable. But if we compare results for two different tests, as arithmetic and language where the same possibility of variation in instructional method exists, in the absence of specific standards for the determination of the incidence of methods, how shall we be able to say which range is the greater and which the lesser? The problem is, then, to find a method of standardizing attainment ranges so that it will be possible to set these ranges in equation with one another and with standard intelligence ranges.

Suppose that, out of thousands of seventh-grade pupils, tested for intelligence and attainment in arithmetic, twenty-five should fall in the one hundredth kental intelligence class. The raw scores of these twenty-five subjects for the arithmetic test would vary within certain limits. This is the result of the tendency of individuals to vary more widely with respect to special than with respect to general capacity. The median attainment score of the twenty-five subjects may be taken as typical of the arithmetic ability of seventh-grade pupils of a 100*k* intelligence. We may, then, fairly hold that the attainment median scored by the maximal or one hundredth kental intelligence class and the attainment median scored by the minimal or first kental intelligence class mark the upper and lower limits respectively of the attainment range which may be taken as typical of the given range of intelligence.

From the theoretical point of view, under experimentally ideal conditions, the attainment scores of a group of subjects of a given class or level of intelligence, will vary within the limits  $y_1, \dots, y_n$ . Following the law of probability, these items will be distributed in accord with the curve of normal frequency, which identifies the position of the measures of central tendency, the mean, mode, and median. If we let  $y_m$  stand for the central

tendency, then we can say that where any set of factors, such as superior instructional method, operates to produce a score exceeding the central tendency by the amount  $t$ , as  $y_m + t$ , a set of factors as, in this case, inferior instructional method, will operate equally by the amount  $t$  in the opposite direction to produce a score of  $y_m - t$ . It follows, then, that the intelligence medians, of  $n$  classes of subjects will correlate unity with the respective attainment medians,  $y_{m1}, y_{m2}, \dots, y_{mn}$  of these same intelligence classes. Hence, the range of ability measured by the attainment medians of the marginal intelligence classes is theoretically identical with the range of ability measured by the intelligence medians of these same classes. In this way, I believe, a satisfactory basis for the equation of the kental attainment range with the kental intelligence range is provided.

The method of marginal medians for computing the attainment range for Table IV was not followed for the reason that the necessary data concerning all subjects were not available. The range employed was obtained from the highest and lowest scores. While this method is not as strictly accurate as the one just discussed, it is sufficiently so to illustrate the principles with which this paper is concerned.

It may seem at first glance that the method of highest and lowest scores does not show the relation between intelligence and attainment for the subjects of highest and lowest rank respectively. If, for example, a subject receiving a kental intelligence score of 87, should receive a kental attainment score of 89, the ratio of the second to the first would be more favorable than it would for a subject whose score was 100 in both cases. Even if the second subject should advance his raw attainment score by a considerable amount while the raw score of subject one should remain unchanged, the ratio of his attainment to his intelligence score would still be 100:100. In other words, his raw attainment score would advance while his kental attainment score would remain the same. But while the raw score of the first subject remained absolutely the same, his kental attainment score would decline. This would be due to the fact that the absolute ad-

vance of the raw attainment score of the second subject (scores of other subjects remaining constant) would increase the range and so decrease the value of the constant scores when they were expressed as percents of the increased range. Similarly, the effect of decreasing the absolute score of the subject of lowest rank would be to increase the range and so increase the value of the constant scores when expressed as kentals.

Thus it will be seen that the method of highest and lowest scores does serve to develop and render comparable differences in attainment and intelligence when both kinds of measurement are transverted into kentals. It will be found to tell a fairly truthful story so long as the highest and lowest scores do not vary extremely from the positions which the general tendency of dispersion within the group would assign them.

The foregoing discussion will doubtless suggest to the reader the possibility of expressing the numerical relation between attainment and intelligence as a ratio. We can not, however, use the simple ratio of the kental attainment score to the kental intelligence score as an expression of this relationship; for, owing to the difference in the value of items in the lower and upper parts of the range, such a ratio would be inaccurate. A difference of ten points in the upper part of the range would give an index quite different from that resulting from a difference of ten points in the lower part of the range. For example, if the subjects should receive an intelligence score of  $100k$  and an attainment score of  $90k$ , the ratio would be 0.9; but if his intelligence score should be  $20k$  and his attainment  $10k$ , the ratio would be only 0.5. Let us examine a way of improving on this crude ratio.

If we assume a perfect correlation between mental and educational ability, then the ratio between the attainment transversion of a given subject and his intelligence transversion would be an accurate index of his learning efficiency. If now we find *the difference between a subject's kental attainment score and his kental intelligence score*, noting the direction of difference by a plus or minus sign, we shall have a measure of the subject's devia-

tion from a perfect correlation. A deviation of +10, then, would mean that a subject's kental attainment score varied positively from his kental intelligence score by an amount equal to ten percent of the range. If now we let 100 stand for perfect correlation, and add to or subtract from this base, according to the sign, *the computed deviations from a perfect correlation*, we shall have a serviceable ratio of learning to intelligence. This ratio I have called the *coefficient of learning*. It signifies the efficiency to which a given subject or group of subjects have at-

TABLE V.—THE RELATION BETWEEN ATTAINMENT AND INTELLIGENCE SCORES

A. ATTAINMENT DEVIATIONS				B. COEFFICIENTS OF LEARNING			
M.I.	A.-I.	R. C.-I.	L.-I.	A.	R. C.	L.	AV.
86	-11	-12	-24	89	88	76	84.3
75	+4	-12	-14	104	88	86	92.6
69	+7	-12	-11	107	88	89	94.6
65	-5	-5	-11	95	95	89	93.0
56	+14	+5	-2	114	105	98	105.6
48	+21	+3	+14	121	103	114	112.6

tained in the use to which they have put their intellectual capital in the process of learning.

Since the kental range is always one hundred, this method of computing a coefficient of learning permits a record of all possible theoretical cases. As proof, consider the extreme possibilities. If the intelligence score is *ok* and the attainment score *100k*, the deviation is +100 and the coefficient of learning is 200. If, on the other hand, the intelligence score is *100k* and the attainment score *ok*, the deviation is -100 and the coefficient of learning is 0. Within these extremes lie all possible theoretical variations in learning efficiency.

In Table V-A are recorded the deviations of the attainment medians given in Table IV-B from the intelligence medians given in Table IV-B. In Table V-B the coefficients of learning have

been computed by the method just described. A study of Tables V-B and IV-A may serve as a test of the relative effectiveness of crude scores and coefficients of learning as a means of comparing attainment in learning with general intelligence.

The general conclusion to be drawn from Table V-B is that the resources of the pupils of highest intelligence have been taxed less severely by the learning process than have the resources of the pupils of least intelligence. The coefficient of learning appears to give an excellent check on the classification of pupils according to ability to learn. The desideratum certainly is that each pupil be given opportunity to advance educationally as rapidly as he may. It is bootless to argue in favor of a rigid classification according to intelligence alone, for it matters not so far as the organization of instruction is concerned whether a pupil's inability to advance is due to lack of intelligence, lack of interest, lack of instructional efficiency, or what not, so long as the fact of his inability is apparent. The coefficient of learning, to be sure, does not enlighten us as to the nature of the factors operating to accelerate or retard the pupil beyond the place which his intelligence would indicate he should occupy. It does, however, enable us to experiment intelligently with such factors and to determine their relative causal efficiency.<sup>5</sup>

In the elaboration of the method of this paper, the writer has aimed to facilitate the comparison of incommensurable quantities. According as it serves this end, the kental principle and its application in the computation of the coefficient of learning must be judged.

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<sup>5</sup> In the comparison of the coefficient of learning with the achievement quotient as developed by Buckingham and Monroe, I have found that the computation of the quotient from mental and achievement ages requires on the average from five to six times as long as the computation of the coefficient from kental intelligence and attainment scores. The operations involved in deriving the coefficient of learning are, indeed, so simple that they may be performed by the average teacher without the use of deviation tables. The only tables with which it would be necessary to supply the practitioner would be the tables for transverting raw scores into kentals. The preparation of such tables, as described on p. 145, is so much simpler than the preparation of the tables for obtaining achievement ages and achievement quotients that the fact may appeal to the experimenter concerned with the standardizing of tests. The factor of age does not enter into the calculation of the coefficient of learning. The relation it draws between attainment and intelligence is immediate.

## Editorials

### THE USE OF THE MEDIAN IN SUPERVISION

Supervisors are well acquainted with the use of the average (arithmetic mean or median) for the purpose of summarizing in a single figure the performance of each class under their supervision. This device, however, is not as widely used as it might be. In particular, it is not applied to the supervision of such subjects as English composition and handwriting where the securing of an average is thought to be difficult. We believe that, partly for this reason, the supervision of such subjects—particularly of English composition—is less effective than the supervision of any major line of work attempted in the school. The mere bulk of the writing done by a class of average size makes it impossible for the supervisor to examine all of it. Moreover, the better the teaching of composition, the more there will be of such writing; and when to the amount of written material of one class is added the amount for all the other classes under a given supervisor, the problem of reading the material becomes impossible.

The median, however, is an average which may be applied to written compositions in such a way as to permit real supervision without undue labor. The reader will recall that the median is the middle item of a series arranged in order of magnitude. In order to establish it, it is merely necessary to rank the items; and this may be done without even knowing their values in terms of a definite unit. Anything which will differentiate the items so that they may be arranged in order of size will serve to determine the median. Indeed, it is not even necessary that all, or nearly all, of the measures should be so arranged. It is sufficient that the items occupying central positions be given their proper order.

In the case of samples of English writing, it is entirely practicable to arrange the papers in the order of their merit without

measuring any of them. When this has been done, the middle composition is the median or average performance of the class and may stand as the type just as appropriately as a numerical average or median obtained from a spelling test or an arithmetic test. If the question is asked, "How well did the class do this week in its composition work?" one may point to the median paper and say, "This is how well the class did." If it is then desired to have this median paper rated by means of a composition scale, the typical performance may thus be given numerical form.

We have said that it is entirely practicable to arrange compositions in the order of their merit. Supervisors know how inevitably a teacher puts the best composition on top of the pile which the supervisor is to see. The next best composition is second, and so on. There is here, whether for aesthetic or impressionistic purposes, an evident ability to distinguish between compositions on the basis of merit. In fact, the whole idea on which the rating of composition work depends—a rating which in the form of percents, units of a scale, or otherwise, is always regarded as necessary—is that one can distinguish merit in English writing.

It is conceded that in any given group of compositions, there will be a number of papers between which it is difficult to distinguish. This is particularly true among the papers written by the children of average ability. It is precisely among these papers, however, that the median is likely to be found. We suggest here the use of a pairing method. Having identified a number of the best and poorest compositions, one may arrange the middle group by comparing each paper in the group with every other paper, giving in each of the one-to-one comparisons a preference mark to the paper which is superior. Within this group of medium papers order of merit will then be established by giving first place to the paper having the greatest number of preference marks, second place to the one having the next greatest number, and so on. If it should be found that even by the use of the pairing method the merit of some compositions can-

not be distinguished, and if the median composition is among these, it is clearly immaterial which of these compositions is taken as the median.

But by whatever means the compositions are arranged in the order of merit, the middle one may be taken as the type. Of course, if there is an even number of compositions, there is no middle one, and one of the two middle papers should be selected. As a practical procedure it would be well to agree to take the better of the two, and to do so consistently. As a matter of fact, the difference in merit between the better and the poorer of these two compositions would scarcely be appreciable.

The progress of a class over a period of time may be noted by comparing a series of these median or typical compositions. It will be found to be stimulating to mount the typical compositions of a class on a chart. If a set is obtained each week, one might then have for each class from fifteen to eighteen typical compositions during a semester. These, whether or not they are rated by a composition scale, will picture the amount of improvement in the class throughout the term.

This is a supervising device. It is not to be understood as a teaching device in the sense that it gets at individual differences. It is true that it will stimulate effort on the part of both teachers and pupils; but so will any good supervisory device. The value of the scheme lies in the fact that it enables the supervisor to keep track of the trend of teaching so far as that trend is manifested in the general merit of composition writing.

Moreover, it is a device applicable in surveys. The reason so little space in published surveys is given to English composition is because of the difficulty of measuring it. There is no disposition among surveyors to belittle it as unimportant. The few surveys which have attempted to measure the work of school systems in English writing have done so at the vast expenditure of energy necessary to rate all, or a very great number, of the composition papers. Yet the averages or medians of these ratings were the figures in which the surveys were primarily interested. We submit that it would be far less laborious, and

would probably make it possible for the surveying of composition work to be more frequently attempted, if the teacher of each class arranged the pupils' paper and identified the median paper. This could then be measured by means of a scale. The few samples which this method would require the surveyors to rate would enable them to have each sample rated by several judges. In other words, our suggestion would be that instead of measuring all the samples and obtaining the medians from the measures, it would be equally satisfactory and far less expensive to obtain the median first and then to do the measuring.

B. R. B.

#### INCREASING PRODUCTION

The president of a business concern is a hard customer for his research man to handle. His is not the paternal attitude which graces the personality of the university president as he fosters and protects research. He has a voracious appetite for results which show in economy of production. He may permit the research executive to study his own little hobbies or engage in the investigation of long term problems; but here and now at very short intervals he requires him to show concrete evidence of increasing economy in production. The president is interested in the development of standards by which to measure efficiency and in the defects of operation which the standards reveal. But he immediately wants to know how the defects are to be cured. His appetite for this diet is particularly keen and if he is placed upon short rations he becomes irritable and will, in a moment of undernourishment display temper and fire the cook. He has not been sold to the idea that research conducted merely for its own sake is worthy of support as a business proposition.

This situation has its defects and its advantages. It may lead the research man to turn out hasty work, but it also leads him to keep persistent pressure behind his investigation so that he is able to turn out good work rapidly. It is even possible that his work may be better than would be the case if it were done in more leisurely fashion. Then too, the wise research man by dividing his problems into two classes, long term and short term, has

enough of the former to satisfy himself and of the latter to satisfy the firm. But he knows that all his problems must center round the procedures for increasing production. Tests and standards are useful as indices of efficiency or its lack, but they are only one of the many tools which he must use in securing efficient operation of the business.

A public school system is a production organization. The board of directors are laymen, who have a superintendent of the plant to administer the technical end of the business. He has teachers as foremen who direct the pupils as workmen. The problem of production is present—the manufacture of experience and the acquisition of learning. The school production plant is subject to all the defects of any other production organization. The pupil-workmen are willing or unwilling, ignorant or intelligent, wasteful or economical of effort. The teacher-foremen are good disciplinarians or poor, they route the material economically or extravagantly, they train efficiently or inefficiently. The superintendent may be keen for efficiency, or he may be busy with the details of his office and not know what is going on in the workrooms. He has trouble in judging of the output because it is not put up in bales or measured in money.

At this point enters the efficiency man. He is employed, opens a research bureau, and is given *carte blanche* to do what he can to increase efficiency. The superintendent may have faith in the outcome or he may, as many business presidents do, follow the fashion because it is not good form for any progressive organization to be without its research department. But whatever the cause, the research department is installed.

The first task it undertakes is to establish standards. Educational tests are given in arithmetic, spelling, writing, and other school subjects; and the work of teachers and pupils is evaluated for praise or censure. Mental tests are administered and both the defective and the supernormal are detected. Creditable reports are published, filled with findings which show comparisons of class with class, school with school, and system with system.

At this point the parallel between educational production plants and industrial plants ceases. The business president, with

his eye fixed steadily upon profits, intimates to his research man that now is the time, after the standards have been made and applied, to make studies of methods of curing the defects. He insists upon time studies, and training in the more efficient methods which research reveals. No matter what the efficiency executive may prefer to do, he is compelled for the good of the business and for his own safety as well, to study production processes.

On the contrary, the superintendent of the school production plant has less concern about his output because it is relatively intangible. He does not have to show dividends to his board of directors because the coin of his realm is spiritual and not material and financial. So his efficiency men are not brought to task if they stay in the fields of standards and tests and neglect the improvement of service.

But this does not relieve them from responsibility. They realize that many pupil-years of time are lost annually because of inefficient methods. By their tests they detect the widest disparity between teacher and teacher and between pupil and pupil. They know that the teacher is handicapped because of the lack of material in the form of books, exercises, and illustrative material. If the school were held to be a business, they would be compelled not merely to detect these deficiencies but in addition to remove them by studying methods of teaching and learning, by collecting generous supplies of the best methods from expert teachers and making them available for all, and by showing teachers how to save the time of the pupils and the pupils how to save their own. The insistent demand of business is for economical production and the inescapable duty of the educational research department is for the maximum of learning in the minimum of time.

The sagacious school superintendent has borrowed a leaf from the book of the industrial president and judges the efficiency of his research division by the results it is obtaining in his production division, in the workrooms of the school.

W. W. C.

## Reviews and Abstracts

CAMERON, EDWARD HERBERT. *Psychology and the school*. New York: The Century Company, 1921. xiv + 339 pp.

This book is an introductory text in educational psychology, intended for teachers and students who have had no previous training in the subject. It contains first an account of the general facts and principles of psychology, treating the usual topics, including the nervous system, native and acquired behavior, sensation, perception, memory, etc., down to voluntary action. The condensed treatment does not permit of many illustrations, but the applications which are made are predominantly to educational situations.

The remainder of the book is more directly educational. Four chapters deal with the problems of learning, transfer of training, individual differences, and mental development and four with the methods of learning exhibited in certain of the school subjects, namely, reading, spelling, writing, and arithmetic. The author has shown skill in selecting the most important phases of these subjects for emphasis and has succeeded in presenting the chief known facts about them clearly and simply.

The style is very lucid and direct, the treatment of the various topics is balanced, and the selection of phases of the subject to be emphasized is judicious. The organization of the subject matter is logical and consistent and exhibits none of the careless planning which is often met with in books on educational psychology. The author's opinions are grounded upon a broad and thorough training in the science, and his presentation of the subject is the outgrowth of ample and successful experience as a teacher. The book, therefore, is an exhibition of thoroughly good workmanship and may be highly commended to teachers as an introductory textbook.

FRANK N. FREEMAN

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CRANE, A. G. *Education for the disabled in war and industry*. (Teachers College, Columbia University, Contributions to Education No. 110) New York: Teachers College, Columbia University, 1921. 83 pp.

The author of this monograph was at one time Director of Educational Service, Division of Physical Reconstruction, United States Army. He embodies in it data from his more exhaustive volume on physical reconstruction in *The Official Medical History of the War*.

The introductory pages show the value of the educational service to physical reconstruction in providing "happy, useful, curative occupations." Then follows an analysis of the main factors in the educational problem,—

number of patients, nature of disability, previous schooling, intelligence, previous vocation, preference for future work, available time and equipment.

The magnitude of the whole undertaking may be seen from the fact that instruction was given in 150 subjects to 100,000 men in 50 hospitals by 2500 instructors. The enrollment in educational classes increased during 1919 from 29 to 61 percent of the total hospital cases. The curative work was sometimes general (e.g., building up physical tone) and sometimes specific (e.g., typewriting for stiff fingers). A novel aspect of the latter was metro-therapy—the measurement of extent of motion in disabled members by ingenious attachments and the use of practice curves in prescribing treatment and to encourage the patient. While the work at its inception was mainly for curative purposes (occupational therapy) it became closely related to vocational readjustment (rehabilitation). While performing educational projects to help cure his disability, the patient was in many cases receiving training that would assist him in his subsequent vocation.

A chapter is devoted to methods of survey, guidance, and instruction. The soldier received a medical, surgical, and psychological examination and a thorough interview. When all the data were collated therapeutic and vocational plans were laid in conference with the patient himself. The instruction was based on "unit courses" organized about a task. For example in auto mechanics the course consisted of the repair and adjustment of a single engine. Each task was not only a complete unit in itself but was also part of a series of courses in the same general field. Thus, a patient who was in the hospital for only a short time could take at least one course, while a patient who was confined for a longer time could take a series. This method moreover made feasible the instruction of a man who by reason of disability could attend class only irregularly.

The author discusses finally the implications of the work of the educational service for schools and for the education of those disabled in industry. Statistics show that the problems of the disabled in industry are of considerable magnitude and fundamentally similar to those dealt with in the war. The methods of survey and guidance developed in the army might well be used with industrial patients. The fundamental principles of occupational therapy and rehabilitation are likewise applicable. The author stresses the short unit course organized about a task. While realizing that this is not the conventional procedure, he feels that "for motive and interest, for similarity to actual industrial conditions, in possibilities for acquiring a sustaining foothold in the industry in the shortest possible time, it presents manifold advantages." It makes it easier to induce men to undertake adequate courses of preparation. In the army the completion of one unit course left the student eager for the next. The text-book for such a series of courses comprises a collection of tasks with directions and references for each. The author goes on to suggest the possibilities of this method for education in general and particularly for the study of science and manual arts. "Electricity studied in connection with a telegraph project may be studied much more profitably than if the logical conventional method be followed."

The reviewer concedes the necessity of the unit course method of instruction in the war emergency and its probable advantage in some types of industrial rehabilitation but is not convinced of its value in general educational procedure. He wonders if it would produce, for example, outstanding men of science who would devote their lives to fundamental problems. He suspects that the average student who studied his electricity by telegraph projects would pursue as little fundamental theory as possible and would have little appreciation for scientific ideals. The danger of producing sterile technicians rather than productive scientists is not imaginary. And more fundamental still is the question whether we should train all the youth or should educate some of them.

The monograph gives in brief readable form the history of a very significant and novel branch of the army. It is clear and concise. The quantitative aspects are well presented in tables and charts. There are numerous illustrations and an appendix containing a number of case studies. In laying aside the book the reviewer has two distinct impressions: one, the magnitude of the tasks confronting those engaged in rehabilitation; the other, the interesting educational implications raised by the unit course method of instruction.

HAROLD E. BURTT

*Ohio State University*

O'BRIEN, JOHN ANTHONY. *Silent reading; with special reference to methods for developing speed.* New York: The Macmillan Company, 1921. xvii + 289 pp.

This book will be warmly welcomed by those who wish to encourage experimentation under normal school conditions, and particularly by those who are attempting to improve the various abilities involved in silent reading. This does not mean that the book is written merely for the professor, the superintendent, or the graduate student. Any professionally minded teacher who wishes to study seriously the problems in silent reading will find the book readable and very helpful. There is probably no single volume which so well presents in a few pages the essential knowledge of the technical elements entering into the process of rapid silent reading. It will doubtless find its place in the teacher's professional library alongside of Huey's *The Psychology and Pedagogy of Reading*, and along with the suggestive treatises which have recently appeared in special monographs and in the yearbooks of the National Society for the Study of Education. Doctor O'Brien's presentation is uniformly clear and plausible—so much so in fact, that it is perhaps worth while to urge certain cautions and reservations with regard to some of the conclusions implied or explicitly stated in the book.

1. In common with most writers who are insisting upon greater relative emphasis in silent reading, Doctor O'Brien leaves the impression that oral reading has little place, if any, in the school. Now oral reading can be justified, not as the best method of teaching silent reading (although Judd and Gray recommend this in the primary grades), but as a desirable social accomplishment and as an aid to literary appreciation, particularly in the case of poetry. The fact is that oral and silent reading constitute two objectives which must be attacked separately and by different technics. Of the two,

silent reading, because of its relation to study is, of course, vastly more important.

2. While it is undoubtedly true that the backbone of the course in silent reading would consist of "the synthetic mode of attack—training in the whole organized process of reading itself," this does not mean that elements may not or should not be isolated for special training. Indeed, this is exactly the method used by O'Brien although, of course, in the large reading setting. Moreover, others have obtained improvements as marked as those here reported—improvements which like these have resulted from exercises where the one variable consisted of practice in certain elements in isolation. This is particularly true in exercises in word, phrase, and sentence flashing. Although more likely to be abused, the principle of isolation of a given factor for special training is no less fundamental than that of "direct synthesis" as urged by O'Brien. These two methods of attacks go hand in hand, the synthetic method necessarily receiving the main emphasis, but being supplemented by exercises for the purpose of developing certain special abilities.

3. The author is perhaps over-sanguine as to the amount of improvement resulting from his exercises and as to the permanence of this improvement. There is reason to believe that the improvement from such exercises is rarely, if ever, so great as is indicated by increased scores on standard silent-reading tests. This is particularly true where the test in the practice exercises or the length of the exercises duplicate in kind the test and length of exercise in the standard test. In this case a part of the large improvement shown, both in daily exercises and tests, is likely due to the improvement in a special type of reading and in the ability to take a special type of test. On the other hand, there is clear evidence in the photographs of eye movement that marked improvement did occur. One naturally expects, too, that at least a part of this fundamental improvement will persist.

4. Too much emphasis cannot be placed upon the author's provision for assuring and testing comprehension. Indeed, many would go farther and provide that much of the reading be done for purposes other than to take a test, that is, with objectives in mind in the form of questions to be answered through reading. There is reason to believe that much better results in comprehension would have been obtained had the chief emphasis been placed upon having the children race to find quickly the answer to specific questions, rather than to read rapidly in order to be able to answer questions which are not in the pupil's mind while he is reading.

There are other questions raised by the discussions in the various chapters. For example, many may suggest that speed exercises are more advantageously conducted with factual, content material. In fact one of the chief values in this book is to be found in the clearness with which the chief issues are stated, and the consequent stimulation of a critical consideration of the data and conclusion which the author presents. It is natural that at this stage of the development of our knowledge of silent reading, there are, at certain points, differences of opinion. The book is proving a very valuable text for schools which are studying the problems involved in improvement of abilities in silent reading.

ERNEST HORN

*State University of Iowa*

O'BRIEN, JOHN ANTHONY. *Silent reading; with special reference to methods for developing speed.* New York: The Macmillan Company, 1921. xvii+289 pp.

This monograph presents the results of a very useful undertaking. It attempts to introduce and test in actual school practice an improvement in the methods of learning to read which laboratory experiments have long indicated to be worth trying. The author's specific problem, as indicated by the sub-title, deals with the methods for increasing the speed of silent reading. He has developed his methods as the result of a careful review and analysis of the now very extensive investigations of the reading process, many of which have, in recent years, been carried out with notable success at the University of Chicago. The author's own investigations were conducted under the auspices of the Bureau of Educational Research of the University of Illinois in forty classes of twenty different schools located in nine cities of Illinois. The training which extended throughout grades three to eight inclusive, was for thirty minutes a day for 36 days. Of this time 20 to 25 minutes daily was devoted to actual reading, sub-divided into five to seven short periods of intensive drill in which the attempt was made to increase the speed of reading without loss of comprehension or understanding of what was being read. In order to measure the progress three forms of the Courtis Silent Reading tests were administered, one at the beginning, one after the eighteenth day of practice and one after the thirty-sixth day of practice, thus involving altogether thirty-nine days of experimentation.

Three types of training in rapid silent reading are discussed in detail, and careful directions formulated for carrying them out. In Type I the advantages of rapid reading were presented to the pupils, and, after a short preparation for word recognition and thought getting, the following instructions were given:

"Read it as fast as you can. I want to see how much you can read in two (or three) minutes. But remember that I am going to ask you to tell me about what you have read, so do not skip anything. Try to read faster to-day than you did yesterday."

The method of training, thus, consisted essentially of alternate reading and of reproduction occupying not more than one quarter of the time allowed for the exercise. As incentives to increased speed each pupil kept a chart of his daily performance, and a complete chart of the daily class performance was conspicuously displayed in the classroom.

The Second Type of training attempted to decrease vocalization or inner articulation with identical instructions as in Type I for increasing speed. This instruction was therefore added. "Do not pronounce the words to yourself, as that will cause you to read more slowly than you otherwise would." As would be anticipated, it was found "that the effort to lessen inner articulation was far more successful when the individual not only consciously endeavored to inhibit such but also read more rapidly at the same time."

A Third Type of training was proposed, and discussed in detail, but not carried out for the lack of suitable apparatus; namely, to increase the span of word perception by short exposures of words, phrases, and sentences by means of a tachistoscope designed for class use.

Classes were divided into two groups, A, the experimental group, and B, the control group. The selection was very accurately made by pairing individuals who showed approximately the same speed on the preliminary Courtis test; one of each pair being put in the experimental and the other in the control group. Although the control pupils were taught by the same teachers in the same classroom, and themselves

showed considerable increase in speed of reading as a result of the attention given to the experimental group, the same difficulty so often faced in other investigations requiring control groups appears in this study. The instruction for the control group was that they were "to be taught in the usual way." They profited somewhat, however, by the special attention and general interest aroused by the experiment, although they lacked the specific incentives of individual and class charts for noting the rate of improvement, and of other exercises incident to the experiment.

The relative superiority of the experimental group over the control group at the end of the experiment, which is marked, must be discounted somewhat as a result of this last consideration. Not all the gain can be attributed to the methods in question. The average gain for the experimental pupils in the five grades was 110 words per minute, as compared with the control group's gain of 64 words per minute. Increasingly larger gains were made with each advance in school grade, that for the fourth grade being 80 words for the experimental group and 33 for the control group, as compared with 172 words for the eighth-grade experimental group, and 90 for the corresponding control group. The average gain of the eighth grade was larger than that of the seventh by 56 and 43 words for the two groups as compared with gains of 20 and 17 words by the two groups in the seventh grade over the averages of the sixth grade. The fifth-grade experimental group gained on the average but seven more words than the fourth, and the advance of the sixth grade over the fifth averaged also 7 words. The control groups in the third, fourth and fifth grades each showed about the same amounts of gain. These marked differences in the amount of improvement between the upper and lower grades must be kept in mind in any conclusions in regard to the factors which were most responsible for the gains noted.

These increases in speed were accompanied by slight improvements in the accuracy of comprehension. There was, at any rate, no loss in this latter respect.

Further objective evidence of improvement was secured in the case of ten pupils by photographic records of the eye movements and pauses before and after practice. These photographic records were made in the laboratory of the School of Education of the University of Chicago. The practice improvement was found to be accompanied by a reduction in the *number* of fixation pauses with little change in the *duration* of the pauses and by a noticeable reduction in the number of regressive movements of the eyes.

The monograph is well worth perusal for its excellent summary of the results of previous investigations bearing on the methods of the present study as well as for the results presented. The chief moral of this study is that less emphasis on oral reading and more attention during the formative period to the possibilities of silent reading may make for better readers.

WALTER F. DEARBORN

*Harvard University*

PYLE, W. H. *The psychology of learning*. Baltimore: Warwick and York, 1921. 305 pp.

"I have tried to state everything that is known about learning," announces Doctor Pyle in the preface of this new book. The delighted reader soon finds, however, that "to state everything that is known" is not equivalent to "knowing all that is to be known." Nevertheless, Doctor Pyle has brought together the best of the experimental literature on the psychology of learning, and while the sub-title, "An Advance

"Text in Educational Psychology" leads the psychologist to expect critical discussions on the controversial points in educational procedure, the contents of this book are essentially practical in nature, addressed to the teacher or school supervisor rather than to the experts.

Each chapter is followed by a list of references; and, where possible, simple class experiments have been developed. The printing is good and the binding is serviceable. The lines of the graphs are too thin for the quality of the paper on which they are printed. The numbers showing the values of the coordinates are too small and weak and should be supplemented by the units of measurement. The descriptions of the experiments give the essential facts and Doctor Pyle's interpretation of their meaning.

In Chapter I, learning is defined as the process of forming habits and acquiring knowledge. A habit is regarded as an act that follows with more or less regularity, upon the presentation of a definite stimulus, to which it has become coupled through experience (p. 1). Knowledge is an idea following upon another idea or perception to which it has become coupled through experience (p. 2). Learning, on the physiological side, consists of building up and establishing preferential routes in the nervous system (p. 5). The only *method* in habit formation is the trial-and-error method when the movement involved has not already been mastered and coupled with the idea of the movement as its stimulus (p. 7). The nature of the learning curve is taken up in Chapter II. The limits of improvement, the different forms of curves, and some suggestions on curve plotting prepare the reader for the experiments reported in the chapters that follow.

The length and distribution of the practice periods, the degree of attention, the attitude of the learner, inheritance, incentives, feeling and emotional elements, the place of drill and its objectives, form the material for the next three chapters. The transition from the physiological aspects to the ideational aspects of learning occurs in Chapter VI. Association, thinking, reasoning, primary experience, the organization of experience, knowledge, meaning, how to study, are presented so as to show that ideational learning is of essentially the same nature as the formation of habits. Chapters VII and VIII cover a discussion of the conditions under which experiences are retained. As to the facts underlying the conceptions of general and specific ability, Doctor Pyle concludes that, "About all we can say is that some brains are better for the important purposes of life than are other brains. Our brains probably have general characteristics which are potent in all intellectual operations, hence, the general learning factor, and the central intellectual factor. But just as surely, brains have certain specific characteristics, effective in specific acts of behavior, characteristics that make one a better seer, or hearer, or taster, for example; characteristics that help or hinder in specific processes, and that must always be considered in connection with the general factor" (p. 172).

Measurements of learning capacity, tests, inter-correlations, relation between learning and general intelligence, are some of the topics considered in Chapter IX. The following chapter is devoted to individual and racial differences, and the causes of these differences are related to the conceptions underlying the classification of students. Deftness in avoiding controversy is shown in Chapter XI in which Doctor Pyle discusses transference and interference and about which he concludes that, "What we do today, determines and limits in some measure what we can do tomorrow. Knowledge which I acquire today may facilitate what I undertake to do tomorrow, but it may also hinder by giving an attitude or mode of attack not applicable" (p. 229). A practical

attitude on the subject of formal discipline is implied by the statement that, "Unless there is some specific contribution to be got from a study, I am not justified in studying it for such by-products as it may give me, for there are many other studies which are valuable in themselves and have the same by-products" (p. 238). Chapters XII and XIII are devoted to a review of the experimental work on fatigue and its relation to school work; and the influence of inheritance as shown in imitation, rivalry, the roving and collecting tendencies, play and education, manipulation. The final chapter devotes its space to the description of such elementary statistical methods as are helpful in conducting simple learning experiments.

The simple and direct style of the author and the absence of hair-splitting argumentation should make this a valuable text for students who are more concerned with making practical applications than they are in developing the theoretical principles underlying the learning process.

ALBERT P. WEISS

*Ohio State University*

NEALE, M. G. *School reports as a means of securing additional support for education in American cities.* Columbia, Missouri: The Missouri Book Company, 1921. 137 pp.

The primary aim is "to suggest a program of school reporting which will assist in securing for public education in the United States the increased support which the needs and opportunities of the present seem to demand." In carrying out this aim, two preliminary investigations were necessary, an historical study of school reports, and an examination of current city school reporting.

The first chapter is a careful study of source material for early school reporting in New England and in parts of the country later influenced by New England. The conclusion is that even in those early days school officials looked upon public school reports as more than mere accounts of how school officials had performed their duties. Even then publication was regarded "as a means of popularizing public education and of creating sentiment for better school equipment and conditions." The second chapter represents an exhaustive study of the facts about school reporting in American cities at present. The third chapter formulates a series of psychological principles and a detailed plan for reporting school facts to the public, which the investigation has shown to be desirable. Four appendices give respectively: extracts from state laws relative to city school reports, a copy of the questionnaire used in the investigation, a check-table showing the particular kinds of school publicity materials used in all cities replying to the questionnaire, and a frequency table with descriptive titles of the charts and graphs found in 68 of the 103 school reports examined.

Dr. Neale went about his investigation in the only practical way, by collecting all the school publications he could and securing answers to a questionnaire from a satisfactory and thoroughly representative number of cities. The material was carefully worked up. Throughout, the reader has the impression that here is the book of a man who attacked his problem scientifically, knew his facts, and did a piece of school investigation that will not have to be done again.

The conclusions, in the light of the reviewer's special interest in this field for years, are thoroughly sound. Furthermore, they are so presented as to form a distinct contribution to our all too meager literature on effective school publicity.

The practical school superintendent of progressive inclinations cannot read this book without being given many new ideas and without being forcefully stimulated to a desire for effective school reporting in his own system. Whether he is seeking light on kinds of school publications, frequency of issue, size of type, illustrations, costs, or ideas for copy, the book will easily furnish satisfactory answers to such questions and to many similar ones. For students of school administration, the book has two values. In their period of training, it will serve future school executives much as it will active superintendents. It is also a model for conducting, summarizing, and presenting a good piece of scientific research in general school administration.

CARTER ALEXANDER

*The Educational Finance Inquiry*

## News Items and Communications

This department will contain news items regarding research workers and their activities. It will also serve as a clearing house for more formal communications on similar topics, preferably of not more than five hundred words. These communications will be printed over the signatures of the authors. Address all correspondence concerning this department to Doctor E. J. Ashbaugh, Ohio State University, Columbus, Ohio.

Annual programs of the National Association of Directors of Educational Research will be given in the Congress Hotel February 28, March 1, and 2. The program of meetings will be found complete in the Association's Department of this issue.

Professor W. L. Carr of Oberlin College (Ohio) has announced an English Vocabulary test. Two forms will be available. Those interested in this type of test may secure copies from Professor Carr.

Superintendent E. C. Witham of Putnam, Connecticut, also announces an English Vocabulary test. The words were selected from Buckingham's Extension of the Ayres Scale and very brief definitions selected from Webster. The problem is one of matching definitions with words. Some of our readers may be acquainted with the Witham Silent Reading and Geography Tests.

Doctor Mason D. Gray, who is in charge of the Latin investigation of the Classical League reports that about one hundred schools are participating in the second part of the testing program. This means that they gave the preliminary test and are following with the second testing of the same pupils. Since satisfactory results are dependent upon from four to six testings of the same pupils, it is most encouraging to know that a very large proportion of the schools are maintaining the program.

Not a few cards are being devised for use in recording the results of tests. The general idea is to furnish an individual card which shall carry a cumulative record for each child throughout his school career. The most recent card of this sort which we have seen is one received from Chicago. It is a modification of the one which Mr. E. E. Keener used while he was superintendent of schools at Richmond, Indiana. This card is especially modern in its provision not only for scores but for ages and quotients—both achievement and mental.

Mr. W. H. Hughes, District Superintendent, Claremont, California, has sent us a students' comparative record card which he is using in his school system. This card contains on the face a place for the record of scholarship

for each semester in his six-year high school course and on the reverse a rating on a large number of items under the general headings of: Capacities and attitudes, special interest, and health and physical conditions. The card provides a five-step rating scheme upon which the child is given a rating on the basis of estimates of teachers and principals. A communication concerning some of the work which Mr. Hughes is doing in his schools will be found in the Department of the National Association.

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Mr. Karl J. Holzinger of the School of Education, University of Chicago, has sent us a Correlation Form for the Product Moment Method which he states he has found helpful in his work. Professor Holzinger does not claim to have devised a new formula but rather that this form upon which data are to be recorded facilitates the computations and minimizes the chance for error. Several sheets of more or less similar nature have come to our attention recently. Any of these doubtless would be of service to teachers of statistics or to workers who find it necessary to have much of this type of work done by relatively untrained help.

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County Superintendent A. G. Yawberg of Cleveland, Ohio, has just informed us that his office is proposing a series of monograph bulletins for the benefit of the schools of his county. The topics treated in these monographs are as follows: Program of studies, supervised study, lesson planning, proper use of the textbook, skill in questioning, economy in time of school room practice, skill in developing initiative, skill in motivating, skill in adaptation to individual needs, skill in making assignments.

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A simple treatment of these topics based on the best results of constructive thinking and experiments which are available in the educational literature in scattered form will certainly be of great help to the educational force in Cuyahoga County.

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We have received from the State Department of Education of Georgia a bulletin giving the definite results from the use of tests in the Dublin school system. The report is written by M. L. Duggan, Rural School Agent, and Euri Belle Bolton of the Extension Department, Georgia Normal and Industrial College. The Dublin school system was the first in the state to make a definite attempt to raise the standard of work as revealed by tests and to give tests a second time to measure progress. The first tests were given in December, 1920, and the second in May, 1921. The report presents the results in detail and should be very helpful to the Dublin schools. We hope that the bulletin may be distributed generously among the schools of the state and that a large number of schools may be stimulated to similar efforts.

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Professor E. L. Holton, Kansas State Agricultural College (Manhattan), has presented us with some very interesting material which he is apparently using in an effort to teach the faculty of that school how to teach, and states that "our teachers are becoming very much interested in the problem of how

to teach." It seems that Professor Holton is offering a course for the faculties of the various divisions. The course includes the following general topics: nature of the learning process, forms of learning, general laws of learning, conditions and factors which favor learning, rate of learning and permanence of retention, individual differences in learning, stimulation to better scholarship, transference of training, formal discipline or general training, and learning for and through application.

It would seem to us that the faculty of any college, the members of which had not had a thorough grounding in psychology and the principles of education, would profit greatly by such a course.

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The North Central Association of Colleges and Secondary Schools will meet in Chicago at the Sherman Hotel March 16, 17, and 18. This will be the 27th annual meeting. The commissions on Secondary Schools, Higher Institutions, and Unit Courses and Curricula will be in session on Thursday, March 16. The Commission on Higher Institutions will report at 10 o'clock Friday morning, March 17; the Commission on Secondary Schools at 2 o'clock in the afternoon. The Commission on Unit Courses and Curricula will report at 10 o'clock Saturday morning, March 18. President L. D. Coffman, of the University of Minnesota, will give the President's address on Friday evening. Statistical reports from all institutions will be required this year. The Commissions on Higher Institutions and on Secondary Schools will therefore have unusually important session and reports. The Commission on Unit Courses and Curricula which is doing important work on curricula organization, is also beginning a study of commercial school organization.

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The pursuit of educational research is without end. The more one knows, the more one finds to learn. One problem is solved only to give rise to others which were not apprehended before. The superintendent who has made systematic use of the results of testing for purposes of classification finds himself confronted with a number of problems subordinate to the main problem of classification. These problems, though subordinate, are nevertheless exceedingly important.

Superintendent B. O. Skinner of Marietta, Ohio, has been classifying children on the basis of tests, but he has found that there are certain types of children in his schools whom the tests do not permit him to classify. These are the children who are suffering from nervous instability; who do well today and poorly tomorrow; who, in other words, may be expected to do anything except consistent work. These cases are largely pathological.

Superintendent Skinner is the victim of his own progressiveness. He feels the urgency of his new problem. But to all but a very few superintendents, the problem does not even consciously exist. Nevertheless, these erratic children are in every system. Perhaps we should recognize that in respect to them, our tests break down. Perhaps we should regard them as clinical cases. If anyone who has experience along this line will contribute something, we shall be glad to receive it.

"Welcome indeed," says P. T. Rankin of the Detroit Teachers College, "is any device that will give better organization for using the steadily increasing body of material in periodical form."

Mr. Rankin writes an exceedingly suggestive letter. He thinks it would be a great service if a standard classification of educational writings could be made up. Existing classifications are inadequate. The Dewey Decimal System for example, is silent on most phases of the virile and rapidly growing body of educational literature. The Bureau of Education has attempted a classification of the field which provides for about thirty divisions; but what we need is something very much more extensive than anything which has hitherto been brought out—something by means of which it may be possible to give every article and perhaps every important portion of an article a place so that at any time a reasonably complete bibliography within the scope of the material found in a given library may be assembled on any important topic. As Mr. Rankin points out, one reads in relation to present interests and perhaps catalogues the articles either mentally or in writing with reference to present purposes.

"Other relations are often neglected, and at some later time, when a new purpose, or group of purposes is dominant, one does not think to refer back to an article which may be relevant but which was not read in that immediate connection." We think Mr. Rankin has a splendid idea. Any research bureau which aims to be a service bureau also, needs such a system of classification.

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#### The Testing Program in the State of Wisconsin for the Past Year<sup>1</sup>

The school officials of Wisconsin meet at Madison once each year and at that time vote on the type of tests which they wish to give during the year. It was in accordance with their wishes that tests were given in the following subjects:

In October the Monroe Standardized Silent Reading Test, and the Haggerty Intelligence Examination Delta 2 were given to the pupils just entering the ninth grade. It was decided to use Test 2 of the Monroe test in order to be able to ascertain just how bad the conditions were with those pupils who were backward in their ability to read silently. The results from 62 schools involving 7,039 pupils show that approximately one-third of those who enter high school fail to reach the sixth-grade standard as given by Monroe, while only 4 percent of the same pupils fall below the sixth-grade intelligence level. In other words, deficiency in ability to read silently can be ascribed to a lack of intelligence in only about 13 percent of the cases. We expect in a short time to send out mimeographed material giving rather detailed suggestions as to how to improve the silent-reading ability of ninth-grade pupils. We feel that this is one of the most important problems which the high schools of Wisconsin are now facing.

The Monroe Silent Reading tests were also given in 24 counties involving 6,208 rural school pupils. The results showed that the rural children were also back-

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<sup>1</sup> This communication was received from the State Department of Public Instruction of Wisconsin being kindly sent by someone too modest to sign his name. The carrying forward of the program this year is under the direction of Dr. W. J. Osburn, who is Director of Educational Measurements in the State Department.

ward in silent reading. Remedial exercises were sent out during the latter half of the year and much effort was devoted to ascertaining if it were possible to carry on a remedial program in one-room rural schools. In five counties where such programs were attempted a second test was given in April and May so that a measure of the amount of improvement could be obtained. The results were gratifying, and the rural teachers and supervisors were very enthusiastic over them.

The Woody-Theisen parallel tests in the fundamentals of arithmetic were given in both city and rural schools. In the rural schools, 27 counties participated involving from 4,000 to 5,000 children. Reports were also received from 19 cities involving from 3,000 to 3,500 children. In order to provide an intelligent basis for follow-up work, all the teachers who participated in the survey were asked to send in a list of the wrong answers which occurred at least twice. In that manner it was possible to secure a list of typical errors. This list has been reported to the school people of the state, and it is hoped that it will become a means of stimulating improvement of instruction in the fundamentals of arithmetic. Results on the Woody-Theisen parallel tests were also received from state graded schools<sup>2</sup> involving from 1,000 to 1,300 pupils. We also received reports from state graded schools on the Monroe Reading Tests representing 1,250 children.

The Hotz Algebra tests were given in 36 high schools involving from 1,100 to 1,600 pupils. These tests were given in March and April. There is a study of errors accompanying this test, and a list of typical errors has been compiled for algebra as measured by the Hotz tests.

Finally the Clapp Language test was given in 17 cities involving 3,000 pupils. The distributions were reported, together with the frequency with which each error occurred.

The children of Wisconsin made a good showing on all of the tests except that in reading. We are planning, therefore, to continue to devote much time and effort to the improvement of our instruction in this subject.

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#### Composition Spelling Test

The rating of children in spelling according to the errors they make in spontaneously written compositions is well under way at Detroit. The course of study in spelling published for the Detroit schools sets up the method by which the testing of the children is to be carried out. The submission of a short composition to a number of teachers who were instructed to score the mistakes in spelling resulted in the identification of from six to eighteen mistakes according to the personal standards of the teachers in question. This condition led to the careful formulation of rules, set forth in the course of study, for rating papers.

There is derived from this type of testing what is called a Coefficient of Misspelling. The number of words of more than three letters are counted as well as the total number of words used in the composition. The total number of spelling mistakes divided by the number of words of more than three letters yields the coefficient of misspelling.

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<sup>2</sup> These are small village schools of two or more rooms.

Returns from about 21,000 children in Detroit are reported in the January, 1922, number of "The Detroit Educational Bulletin." This report points out that although there is a steady increase in the total number of words per composition written in ten minutes as the children progress through the grades, there is an almost constant proportion of words of more than three letters. For example, in the eighth grade 50 percent of the words written contained more than three letters. In the third grade, on the other hand, the figure was 44 percent. Standard coefficients of misspelling are set up in writing the coefficients the decimal point is moved two places to the right. These coefficients ranged from 296.5 for the low third grade to 35.5 for the high eighth grade.

The idea of a coefficient of misspelling is interesting. It is one of the many interesting things which the Detroit people are proposing.

#### The Research Department at Los Angeles

From time to time the administrators of various cities who contemplate the creation of a bureau of educational research or who wish information upon which to base requests for additional support for the Bureau which they already have, send out letters of inquiry concerning the cost and function of such bureaus in other cities. In replying to such a request, Doctor Sutherland of the Department of Psychology and Educational Research of Los Angeles, California, has presented the situation in that city so clearly that we believe it is worth while to pass on the information to all our readers.

"This department now consists of a Director, Assistant Director, Assistant Supervisor, nine teachers and four clerks. The cost to the School Board for salaries is about \$35,000; for supplies, \$11,000; for equipment previously acquired, \$3,000.

"The functions of the department are four-fold, Research, Supervision, Administration, and Instruction.

"1. *Research.* So far our research has been limited to class room instruction. We attack this problem from two points of view. From the administrative point of view we measure the results of teaching. We have not yet been able to cover the entire city through lack of funds. From the individual point of view we select those pupils who need better attention in order that they may spend their time profitably in the schools. We have yet to find a room in the school system which does not cover at least three grades when the actual performances of the children are considered.

"It is the function of this department to conduct research into every phase of school activity and it is anticipated this year that the board of education will set the research department outside of the machinery of the school system so that it may be in a favorable position to gather, for the superintendent and the Board, data regarding all phases of school activities.

"2. *Supervision.* At the present time this department has charge of the instruction in development rooms, adjustment rooms, and opportunity rooms. It has just turned over to another department the supervision of the special work with foreign children.

"3. *Administration.* The department has been burdened with a considerable amount of administrative detail and personal relationship. This has taken a good deal of time and might just as well be handled by the regular school man. We expect to correct this during the year.

"4. *Instruction.* Since normal schools do not train teachers and cannot train teachers because of the lack of actual school contacts it becomes the business of the public schools to conduct such training under supervisors and principals. This department has trained teachers to handle special work as other departments train teachers for their special lines. In connection with that training it has undertaken to conduct a great deal of research into the course of study. We have found that pupils, if properly taught, can make satisfactory progress in the higher grades if given only the minimum essentials in preparation for that work.

"The results of the work of this department may be indicated possibly by the following figures.

"Our per capita cost in the elementary schools is \$81.94. A misfit and discouraged pupil who is not feeble-minded is taken into the special room and in ten weeks we can in some measure teach him how to study, enable him to cover at least a full year's work and pass on into a higher grade where thereafter he is a satisfactory pupil. These special rooms now accommodate over 1000 pupils. The turnover is four times a year. Therefore, you can see that the educational correction which we are doing is conducted at a cost of not over one-fourth the average per capita cost for the city.

"Since each grade is found to be an ungraded room in that each room houses pupils who can do satisfactory work in grades above or below that in which they are placed, we are faced with the fact that our public schools are woefully inefficient. We do not propose to measure everything but to measure accurately those things which are all ready being measured in the teachers' minds as a basis of promotion. This work is followed by instruction to the teachers which embraces the following points: (1) certain pupils need no teacher; (2) some pupils need a teacher part of the time; (3) some pupils need a teacher a good deal of the time; (4) the methods of study which the pupil acquires will be his study habits all the rest of his life.

A method of room organization is then taught to the teacher so that she can handle her work on that plan and it is working so successfully that the average pupil is proceeding at the rate of two years' work in a year without any sacrifice of special lines which are usually introduced into the rooms.

"Our Board of Education has recognized the effectiveness of our methods and has almost doubled our department this year, yet I assure you that we are completely swamped by the demands of the schools for more and more service."

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#### Tests and Measurements in the Schools of Idaho

During the past and the present school years, the Bureau of Tests and Measurements of the Lewiston State Normal School has conducted a series of mental and educational tests in the schools of Idaho. The results are here summarized for three groups of schools. Class A schools are those meeting certain requirements as to num-

ber of teachers employed, extent of courses offered, etc.; the small city schools are those falling below these requirements; and the rural schools are the rural and consolidated schools of three counties. The tests in the city schools were all given by Professor C. L. Harlan or by the writer and the results were scored under their immediate supervision. It is believed that this uniformity of procedure has resulted in greater accuracy than would otherwise have been the case. The tests in the rural schools were given by or under the supervision of the county superintendents. A detailed report with interpretations of the results and recommendations for administrative action was returned to the superintendent of each school.

The results here reported are for the following tests: Haggerty Intelligence Examination, Delta 2; Monroe's Silent Reading Tests; and Monroe's Reasoning Tests in Arithmetic. Other tests, both mental and achievement, were given but not as extensively as the first three mentioned. The results are reported here, not with the idea that any new principle or method has been used or discovered, but to show the results for a state where the movement of tests and measurements is new, being now in its second year.

In Table I the results for the Haggerty Intelligence Examination are shown. It will be seen that both groups of schools fall somewhat below the grade standards. There is nothing in the character of the population that would lead one to expect this. On the contrary, the people of these communities are of a homogeneous high-grade American stock. It is possible that there is a difference in organization between these schools and the schools in which the tests were standardized. A more liberal policy of promotion, for example, would result in younger pupils, grade for grade, where such a policy is used. This in turn would result in lower median point scores. This factor may also account for the lower scores made by the small city schools as compared with Class A schools. The small number of cases in the former group should also be considered.

Table II shows a distinct superiority in silent reading of Class A schools over the other two groups. One would expect this on the showing made in intelligence. It is likely also that better teaching and a greater abundance of reading material in Class

TABLE I. RESULTS FOR IDAHO SCHOOLS IN HAGGERTY INTELLIGENCE EXAMINATION

	Grades							Totals
	III	IV	V	VI	VII	VIII		
<b>CLASS A SCHOOLS</b>								
Medians	33.4	55.7	74.2	88.8	102.3	115.0		
Number of Cases	348	796	731	726	697	559		3,857
<b>SMALL CITY SCHOOLS</b>								
Medians	33.5	47.6	68.8	87.4	105.2	110.8		
Number of Cases	58	95	103	104	59	72		491
Standard scores	40.0	60.0	78.0	96.0	110.0	120.0		

TABLE II. RESULTS FOR IDAHO SCHOOLS IN MONROE'S STANDARDIZED SILENT READING TESTS

	Grades						
	III	IV	V	VI	VII	VIII	Totals
<b>CLASS A SCHOOLS</b>							
Rate	46.6	66.1	82.7	91.6	104.4	115.2	
Comprehension	6.4	11.1	15.7	18.6	23.3	26.6	
No. Cases	1,015	1,739	1,558	1,498	1,435	1,275	8,520
<b>SMALL CITY SCHOOLS</b>							
Rate	37.8	56.3	69.8	81.1	97.5	100.7	
Comprehension	3.7	8.4	14.5	15.8	20.9	22.4	
No. Cases	222	264	241	220	181	188	1,316
<b>RURAL SCHOOLS</b>							
Rate	38.7	56.7	64.3	81.3	95.3	102.3	
Comprehension	3.7	7.3	12.5	16.6	18.8	20.9	
No. Cases	116	170	194	244	286	307	1,317
<b>STANDARD SCORES</b>							
Rate	52.0	70.0	87.0	90.0	100.0	106.0	
Comprehension	6.8	12.7	17.8	18.5	22.8	26.0	

A schools contribute to this superiority. It will be seen that the scores of Class A schools conform quite closely to the Monroe standards, some grades being somewhat below and others being slightly above standard.

In arithmetic, the scores of the three groups of schools are more nearly equal. When one considers that the teaching of arithmetic does not require as much material as the teaching of reading, a reason appears why the smaller schools are able to do as well as Class A schools. As was stated above, there is no reason for believing that the pupils of these three groups of schools differ materially in intelligence. A difference in the organization of schools is probably a factor in bringing the scores of the rural schools up to those of the city schools. A study of age-grade distribution of city and rural schools show a retardation of 35 percent for the former and 52 percent for the latter. This means that, grade for grade, the pupils of the rural schools are more mature than those of the city schools. Other things being equal, this should result in raising the achievement scores of the rural schools. An interesting sidelight may be thrown on the scores made by the eighth grades of the three groups of schools. In this grade, the rural schools surpass the other two groups. This result is probably attained by the efforts of the rural teachers to have their pupils make a good showing in the eighth-grade examinations which are given uniformly throughout the state.

In connection with a program as described above, the question is often asked as to whether it in any way affects teaching or administration in the schools. One of the most pressing problems in the schools of Idaho is the congestion due to a shortage of buildings. The testing programs frequently made possible special promotions which would tend to relieve the congestion somewhat. Much of the congestion is due to an

abnormal amount of retardation, being as high as 48 percent in some cities. When retardation ranges from this point to as low as 10 percent, it would seem that there is some need for more uniformity of organization. In one city school, a fifth A grade was found which received median scores, equal to or above those of the sixth B grade in intelligence, reading, arithmetic, spelling, handwriting, and language tests. Fifteen of the pupils of this fifth A grade were found to have the median ability, or better, of the sixth B grade. These pupils were accordingly given special promotion into the sixth B grade. Similar procedures were often found possible in other grades on a smaller scale.

TABLE III. RESULTS FOR IDAHO SCHOOLS IN MONROE'S STANDARDIZED REASONING TEST IN ARITHMETIC

	Grades					
	IV	V	VI	VII	VIII	TOTALS
<b>CLASS A SCHOOLS</b>						
Principle	9.0	15.2	13.2	18.7	14.6	
Correct Answer	5.2	9.2	7.9	12.9	7.2	
Number of Cases	865	864	772	802	640	3,943
<b>SMALL CITY SCHOOLS</b>						
Principle	8.3	15.9	14.5	18.1	15.1	
Correct Answer	3.9	9.3	8.3	12.9	9.1	
Number of Cases	135	125	136	100	113	609
<b>RURAL SCHOOLS</b>						
Principle	8.8	13.9	10.7	17.5	16.5	
Correct Answer	4.3	8.1	7.0	11.1	8.1	
Number of Cases	114	100	94	97	108	513
<b>STANDARD SCORES</b>						
Principle	9.6	17.0	15.5	20.7	16.8	
Correct Answer	5.3	9.7	10.2	14.1	9.4	

*State Normal School, Lewiston, Idaho*

I. N. MADSEN

# National Association of Directors of Educational Research

(E. J. ASHBAUGH, *Secretary and Editor*)

TENTATIVE PROGRAMS FOR OPEN MEETINGS,  
TUESDAY, WEDNESDAY, AND THURSDAY AFTERNOONS,  
FEBRUARY 28th, MARCH 1st, MARCH 2nd, GOLD ROOM,  
CONGRESS HOTEL, CHICAGO

TUESDAY, FEBRUARY 28  
RESEARCH IN MENTAL AND EDUCATIONAL MEASUREMENT  
PRESIDENT HAROLD A. BUGG, PRESIDING

1. RESULTS OBTAINED BY CLASSIFYING 2,000 KINDERGARTEN CHILDREN BY MEANS OF THE BINET TEST. Charles D. Dawson, Assistant Superintendent of Public Schools, Grand Rapids, Michigan.
2. RESEARCH VS. PROPAGANDA IN VISUAL EDUCATION. Frank N. Freeman, Professor of Educational Psychology, University of Chicago.
3. EVALUATION OF GROUP INTELLIGENCE TESTS. Raymond Franzen, Director of Research, Public Schools, Des Moines, Iowa.
4. A STUDY OF READING AND SPELLING WITH SPECIAL REFERENCE TO DISABILITY. Arthur I. Gates, Assistant Professor of Educational Psychology, Teachers College, Columbia University.
5. STUDIES OF ANTICIPATION OF MEANING IN READING. C. T. Gray, Professor of Educational Psychology, University of Texas.
6. NEW EXPERIMENTAL INVESTIGATIONS IN READING. Guy T. Buswell, Assistant Professor of Education, University of Chicago.
7. INTELLIGENCE AND PROGRESS THROUGH THE GRADES. Arthur W. Kallom, Assistant Director, Educational Investigation and Measurement, Boston Public Schools.

WEDNESDAY, MARCH 1  
RESEARCH ON THE CURRICULUM AND SCHOOL PROGRESS  
DOCTOR LOTUS D. COFFMAN, PRESIDING

1. CURRICULUM CONSTRUCTION IN AN EXPERIMENTAL SCHOOL. Otis W. Caldwell, Director, Lincoln School of Teachers College, New York City.
2. COMPARISON OF READING, WRITING, AND PRE-SCHOOL SPOKEN VOCABULARIES. Ernest Horn, Professor of Education, University of Iowa.
3. CURRICULUM CONSTRUCTION IN THE COMMERCIAL FIELD. W. W. Charters, Carnegie Institute of Technology.
4. RELATION OF MEASUREMENT TO PUPIL PROGRESS AND CURRICULUM RESEARCH IN READING. Laura Zirbes, Special Investigator in Reading, The Lincoln School of Teachers College.
5. TEMPERAMENT AND ATTITUDE AS FACTORS IN SCHOOL PROGRESS. Clara Schmitt, Bureau of Child Study, Chicago Public Schools.

THURSDAY, MARCH 2

PROGRAM OF RESEARCH IN SCHOOL ADMINISTRATION  
DEAN CHARLES E. CHADSEY, PRESIDING

1. A NEW SUPERVISORY AND ADMINISTRATIVE ORGANIZATION FOR PUBLIC SCHOOLS. P. C. Packer, Professor of School Administration, University of Iowa.
2. EDUCATIONAL MEASUREMENT AS A KEY TO INDIVIDUAL INSTRUCTION AND PROMOTIONS. Carleton W. Washburne, Superintendent of Schools, Winnetka, Illinois.
3. QUALITIES RELATED TO SUCCESS IN ELEMENTARY SCHOOL TEACHING. Frederic B. Knight, Assistant Professor of Educational Psychology, University of Iowa.
4. THE SOCIOLOGICAL CHARACTER OF THE SECONDARY SCHOOL POPULATION. George S. Counts, Associate Professor of Secondary Education, Yale University.
5. METHODS OF INVESTIGATION IN THE FIELD OF EDUCATIONAL FINANCE. George D. Strayer, Teachers College, Columbia University; Director of Educational Inquiry.

TENTATIVE PROGRAMS FOR CLOSED MEETINGS,  
WEDNESDAY AND THURSDAY MORNINGS, MARCH 1st AND 2nd.  
PLACE TO BE ANNOUNCED. FOR MEMBERS ONLY.

*I. Wednesday morning meeting.* GENERAL TOPIC: A CLEARING HOUSE OF EDUCATIONAL RESEARCH NOW UNDER WAY THROUGHOUT THE COUNTRY.

Informal five minute talks will be made presenting succinctly examples of research in all fields of education: mental and educational measurement, curriculum studies, learning investigations, classification of pupils, school finance, school buildings, programs, promotions, etc. The president desires to receive from each member of the Association a brief outline of the research which he will report at this meeting. We should have not less than 20 such reports. Persons have been designated in the different research and training institutions to make reports of research under way in these places. The meeting is organized for the purpose of acquainting us with what our colleagues are doing, to clear our minds as to the direction in which we are moving and to set forth the strength and weaknesses of our present research practice.

*II. Thursday morning meeting.* GENERAL TOPIC: THE PREPARATION AND PUBLICATION OF PRODUCTS OF EDUCATIONAL RESEARCH.

Eight or ten papers and reports will be prepared to discuss crucial issues of educational writing. The purpose of the conference is two-fold: (1) the improvement of educational writing; and (2) the encouragement and stimulation of research workers to publish in effective channels, and in appropriate form, the results of their research.

**ANNUAL DINNER, 6:30 THURSDAY EVENING. PLACE TO BE  
ANNOUNCED. FOR MEMBERS AND INVITED GUESTS.**

1. Presentation by executive committee for election to honorary membership: Dean James E. Russell, Teachers College, Columbia University, and Dr. G. Stanley Hall, President Emeritus of Clark University.

2. Annual Address of Retiring President: The Methods of Science in Educational Research. Harold O. Bugg, The Lincoln School of Teachers College.

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*Iowa State Teachers College.*—Professor Fred D. Cram is doing extended work in testing and measuring in the Rural Schools of Iowa for the Rural Education committee of the National Council of Education. We are sure that those interested in rural education will look forward eagerly to a report of this committee.

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*Omaha, Nebraska.*—Assistant Superintendent L. O. Smith writes us that the contract has recently been let for the construction of a new technical high school which will cost approximately \$3,000,000, and which will be one of the very finest school buildings in the whole country.

In the test field he states that they have given the Kirby Grammar Test to the eighth grade, Courtis Series B to grades five to eight, Monroe Silent Reading to grades three to eight, the Presey Primer Scale to the third grade, and the National Intelligence Test to grade eight.

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*New York State Department of Education.* Mr. J. Cayce Morrison, Specialist in Educational Measurements, has sent us a report of regional conferences on educational measurements which the State Department held this past fall. The report is so full of suggestions to state school administrators that it will be given in full in the Department of News Items and Communications. We do this in the hope that it may receive wider reading there than in our own department.

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*Boslyn, New York.* Superintendent James B. Welles reports that he is just completing a detailed study of the school history of every child now in school and of every child who was in the first grade twelve years ago or eight years ago. Where school records have been adequately kept such detailed studies of the educational history of our children are of very great value. Unfortunately a large proportion of our school systems throughout the country do not have adequate records extending over such a period of time.

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*Claremont, California.* W. Harden Hughes, District Superintendent, is carrying forward some interesting work with his student body. In a recent letter he says, "we are trying to carry out, on a somewhat elaborate scale, a type of human accounting in which we are taking into conscientious consideration the informal elements of a real education. Every student, in going through our junior-senior high school will be rated by approximately 25 or 30 teachers

under whom he receives instruction. The final rating of the students each year is based upon the ratings of all his teachers, on the observations of his principal, and on the results of a number of standardized tests."

Superintendent Hughes states that he is using the term "scholarship probability" instead of the ordinarily used Intelligence Quotient. "When we call them (the quotients) what they really are we eliminate very much danger and at the same time make them much more useful in educational administration. With the interpretation that we now put on these so called intelligence tests I can show the results even to a parent whose child has made less than a normal score without taking chances of being whipped."

"We are making a general study of the improvement which is taking place in the teachers' methods as a result of the emphasis we are placing on the human factor. We are emphasizing in the requirements for super-credit marks, those habits, attitudes, and other characteristics which the world of affairs is eager to discover in her workers and upon which she places a high premium."

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*Kansas City, Missouri.* Assistant Superintendent George Melcher reports that the Research Department is continuing to expand and demonstrate its value. This year they have in progress a high school experiment in the outcome of which our members will doubtless be greatly interested.

"In one of our high schools, we tested about 800 freshmen, using the National Intelligence Test, the Terman Group Intelligence Test, and the Monroe Silent Reading Test. We of course had access to the grades which the pupils had made in algebra and in English. We also asked each English teacher to estimate the intelligence of her pupils as 'very bright,' 'bright,' 'average,' 'dull,' 'very dull.' We made the same request of each algebra teacher. We also had each algebra and each English teacher estimate the ability of her pupils to interpret English as 'very excellent,' 'average,' 'inferior,' 'very inferior.'

"These data were collected and correlations carefully figured. We then selected from these pupils two superior groups for English and two for geometry. The two superior groups in geometry will do plane and solid geometry during the regular school year, or 50 percent more than the usual work. The English class will not cover 50 percent more work but will be given an enriched course. One inferior group in each subject was also selected.

To date, which is not the middle of the year, no transfers have been made from the superior groups in English. However, from the two superior groups in geometry, five transfers have been made to the average group. These transfers were necessary, investigation showed, not because the pupils did not have the mental ability to carry the heavy load in geometry, but because they were overloaded with extra-classroom activities and social duties. The pupils of their own volition, preferred to move at a slower rate in geometry and to have more time for other activities."

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*State Normal School, Emporia, Kansas.*—A letter lately received from Dean A. Worcester, acting Director of the Bureau of Educational Measurements and Standards, Kansas State Normal School, Emporia, Kansas, states a problem which has been

voiced by some of our friends at different times. It is therefore presented here in the hope that the members of our association will consider the question seriously and formulate in their own minds the answer which the Association should make officially upon this topic. Mr. Worcester says:

"In the *Journal of Educational Psychology* for October, 1921, Franzen and Knight in an article entitled "Criteria to Employ in the Choice of Tests" have called attention to facts, very familiar to us, that the average administrator is becoming very much confused among the multiplicity of tests in his attempt to choose the right one. The authors of the above article have, I think, well pointed out the various criteria which go to make up a good test,—for example, that it measure what it pretends to, that it measure reliably, that it be objective, that it have good norms, etc., etc. It seems to me, however, that all this does not help the administrator very much. Just what means does he have of knowing whether or not a test measures what it purports to measure? Or how does he know that it will yield the same diagnosis tomorrow that it does today? It is of course obvious that he can not secure tests and try them out experimentally before using them seriously in his schools. It is true that he may look at the advertising material for a given test and see whether or not it lays claim to these virtues; but I imagine you will find that most of them do claim directly or indirectly to possess all these good qualities, although we all know that they do not possess them in anything like equal degrees.

"It seems to me therefore, that there ought to be some group or organization which will carefully scrutinize the various tests offered and publish critical reviews of them to the end that the administrator may choose wisely. The testing movement depends for its success, it seems to me, not so much upon the number of tests used, as the number which give good results. Could not the National Association of Directors of Educational Research accept this critical activity? I realize that there are certain very practical difficulties in the way, that there is always a feeling of professional courtesy which prevents one from offering criticism which will hurt another's pocketbook; and I realize the further difficulty involved in the elaborate organization which might be necessary in order to test out all the tests offered. It does seem to me, however, that something should be done by systematically reviewing tests in, for example, the *JOURNAL OF EDUCATIONAL RESEARCH*, as we review books. I note, for example, in the current number of this journal which has just come to hand a review of Wilson and Hoke's "How to Measure" by Ashbaugh which frankly takes up the weak points of that book. Why would we not have an equal right to point out as frankly the weak points of any given test? If we are convinced that a given test does not measure what it is to measure it seems to me we could set that fact out with clearness and at the same time be doing a great service to school administrators all over the country. It is my notion that an organization attempting to do this could very well advertise itself to school people as being the place from which they could get expert advice as to the use of tests. I realize that they can and do get certain advice now by writing to the various bureaus of educational research; but the present tendency of book companies to enter widely into the field of distributing tests and to flood superintendents and principals with advertising matter concerning them will, I fear, tend to lessen the direction of testing by bureaus such as ours and put it in the hands of the best advertising book company."

It will be of interest to the members of the association to know that this matter was brought before the executive committee at its meeting in September; but the com-

mittee felt that it ought not to act upon such a matter without having the advice of the members of the association, who have had an opportunity to think over the matter very carefully before expressing an opinion. The publication of this communication at this time should give the members of the Association ample opportunity to consider the question from all angles and to be prepared to discuss intelligently the merits of the question at our meeting in Chicago. The executive committee will welcome communications from members of the Association relative to this question.

#### COMMITTEE TO APPRAISE STANDARD TESTS?

Do we want it? If it can be honest, scientific and practical—yes! If it is to promote some existing “bloc” of test promoters—No!

One of the working principles of such a committee should be that no test should be denounced until it has been carefully tried out.

How would such a committee be appointed? To whom would this committee be responsible? The education of the masses is intrusted to school superintendents and their teachers. How much will they have to say about this committee?

If the chief function of such a committee is to protect superintendents, then, “forget it,” and give the time and effort to more useful pursuits. Superintendents are quite capable of judging for themselves whether a test is pedantic or practical.

On the other hand, if such a committee could be broad gauged, realizing that at the end of the first decade of tests and measurements there are no savants, and that so far only a beginning has been made, but that that beginning, with all its defects, has been a very important one,—with such a conception plus an honest desire to render service, such a committee would be a very desirable thing.

ERNEST C. WITHAM

*Supt. Schools, Putnam, Conn.*

[The above reply from Superintendent Witham is the only one that has come to us as a result of the invitation printed in the January number. (Page 83). We print it in full in order that our readers may get Superintendent Witham's reaction to the situation. Since this matter will come before the Association for discussion at one of the closed sessions, it is hoped that a large number of our members will be ready to express themselves on the proposition at that time.

We would like to call attention to one fact. No one is entitled to be considered an expert in any field because of the position which he holds. Expertness is an attribute derived from unusual knowledge and not from position held. The statements which we have received from large numbers of superintendents would indicate that a great many of them at least feel the need of guidance in the field of tests.

EDITOR.]

# JOURNAL *of* EDUCATIONAL RESEARCH

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Volume V

MARCH, 1922

Number 3

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## A COMPARATIVE STUDY OF FOUR GROUP SCALES FOR THE PRIMARY GRADES

V. A. C. HENMON AND RUTH STREITZ

*University of Wisconsin*

The multiplication of group tests for measuring native intelligence proceeds apace. It is safe to say that more scales can be made in a month than can be adequately evaluated in a year. Departments of education and psychology are importuned for advice and counsel as to the validity, reliability, and relative merits of such scales as are in the market. The following study was undertaken to compare four group scales for the primary grades, viz., Pressey's Primer Scale,<sup>1</sup> Myers' Mental Measure,<sup>2</sup> Dearborn's Group Test, Series I,<sup>3</sup> and Haggerty's Delta I.<sup>4</sup> Several other tests, such as Kingsbury's and Cole's, have appeared since this investigation was begun.

A satisfactory group test for the first grade is difficult to construct because of the necessity for minimizing the appeal to abilities derived from schooling. A test for this grade, however, is particularly desirable, in view of the varying ages of entrance and the absence of other data, such as school marks or accumulated testimony of teachers, which might serve for purposes of classification and prognosis.

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<sup>1</sup> Pressey, Luella W. "Mental Survey Tests—Primer Scale." Public School Publishing Company, Bloomington, Illinois.

<sup>2</sup> Myers, Garry C. "The Myers Mental Measure." Newson and Company, New York.

<sup>3</sup> Dearborn, Walter F. "Group Tests of Intelligence, Series I." J. B. Lippincott and Company.

<sup>4</sup> Haggerty, M. E. "Intelligence Examination, Delta I." World Book Company.

## DATA SECURED

The four tests were given by one of the writers to one hundred pupils in two schools, fifty in two first grade classes and fifty in two second grade classes. The teachers in each of the four classes were asked to rate the pupils on the usual percentage scale in native ability. These ratings were secured rather than school marks which are notoriously inaccurate in the first two grades. Careful notes were made by the examiner of the reactions of pupils, ambiguities or difficulties in the tests, and ease of administration and scoring.

The distributions of the scores in the different tests with the medians, average deviations, coefficients of variability, and the probable errors of the medians, appear in Table I.

TABLE I. DISTRIBUTIONS OF SCORES IN FOUR GROUP SCALES

SCORE	PRESSEY		MYERS		DEARBORN		HAGGERTY	
	GRADE I	GRADE II	GRADE I	GRADE II	GRADE I	GRADE II	GRADE I	GRADE II
0-4.....	1							
5-9.....	2							
10-14.....	3		5		1			
15-19.....	1		6					
20-24.....	2		5	3	1			
25-29.....	1		7	3				
30-34.....	2		6	5		1		
35-39.....		1	5	9	3		1	1
40-44.....	2		12	6	4	1	2	
45-49.....	4	1	3	6	6		1	
50-54.....	5	1		4	10	3	1	1
55-59.....	6	3	1	6	14	2	3	1
60-64.....	7	6		3	6	7	3	1
65-69.....	6	10		4	3	18	4	
70-74.....	6	12				9	11	
75-79.....	2	12		1	2	7	5	3
80-84.....		3				1	4	1
85-89.....						1	5	3
90-94.....		1					2	5
95-99.....							2	9
100-104.....							2	10
105-109.....							3	8
110-114.....								3
115-119.....								4
Number.....	50	50	50	50	50	50	50	50
Median.....	56.5	71	32.5	44	54.5	67	72	99.5
A. D.....	15.8	6.6	10.0	11.3	7.9	6.5	13.4	11.1
C. V.....	.280	.093	.308	.240	.143	.097	.183	.125
P. E.....	1.98	.77	1.44	1.41	.85	.64	1.65	1.13

Figures 1, 2, 3, and 4 show the distributions of Table I graphically.

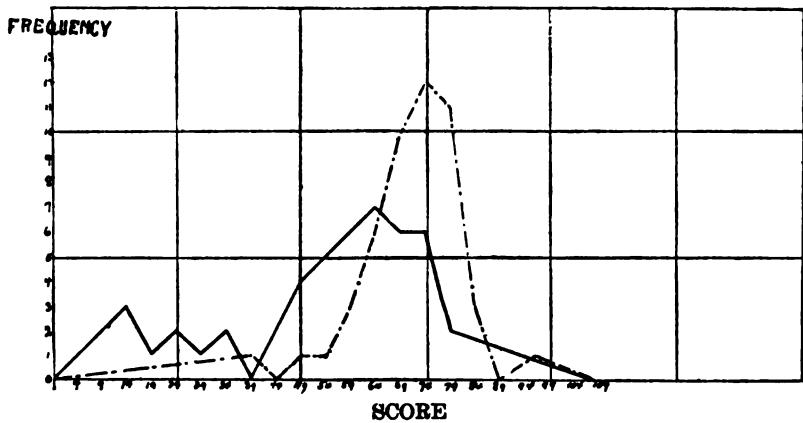


FIGURE 1. DISTRIBUTION OF SCORES ON THE PRESSEY TEST  
(Full line represents first grade, dot-and-dash line represents second grade.)

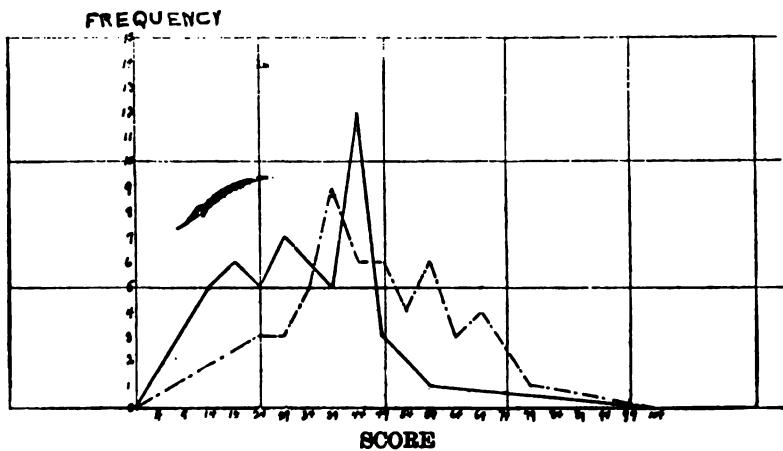


FIGURE 2. DISTRIBUTION OF SCORES ON THE MYERS TEST  
(Full line represents first grade, dot-and-dash line represents second grade.)

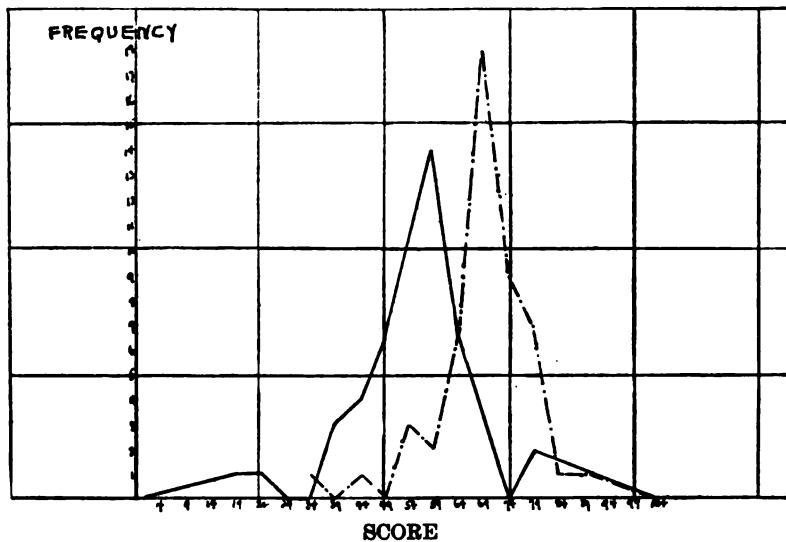


FIGURE 3. DISTRIBUTION OF SCORES ON THE DEARBORN TEST  
(Full line represents first grade, dot-and-dash line represents  
second grade.)

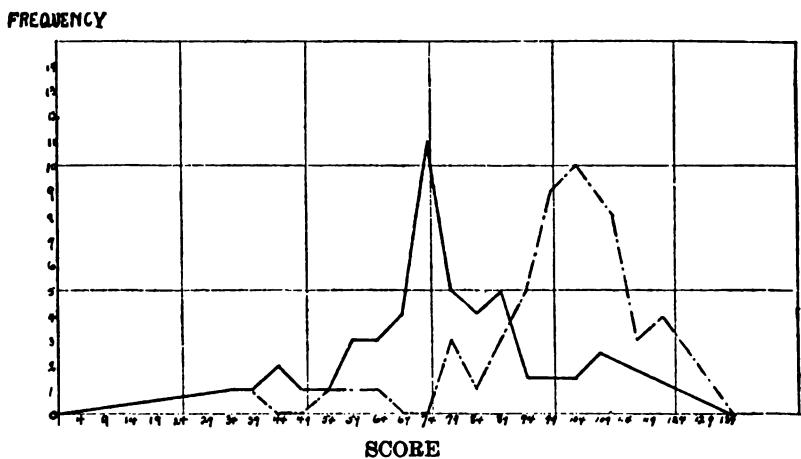


FIGURE 4. DISTRIBUTION OF SCORES ON THE HAGGERTY TEST  
(Full line represents first grade, dot-and-dash line represents  
second grade.)

With such results as these, what tests may be used to determine the relative merits of the different scales? In the absence of an accepted definition of what constitutes intelligence or of an absolute criterion against which the results with a scale may be checked, it is necessary to resort to indirect criteria. Various methods have been employed or proposed by Lowell,<sup>5</sup> Holley,<sup>6</sup> Mrs. Pressey,<sup>7</sup> Pressey,<sup>8</sup> and Kelley.<sup>9</sup>

#### CORRELATIONS WITH TEACHERS' ESTIMATES

Other things being equal, that test will be most useful which correlates highest with some other criterion, such as school marks, teachers' ratings, scores in standard educational tests, or mental ages in individual tests. It has often been shown that there is a high correlation between performance in elementary school and in high school, and between high-school and college performance, as evidenced by school marks or teachers' estimates. If, then, scores in a group scale correlate highly with scholastic ratings or teachers' estimates, they would possess prognostic value and be useful for purposes of classification.

A common method, where the data are available, has been to measure the validity of a group scale by its agreement with the results of the Binet-Simon examination or other test series of supposedly great validity. This involves the assumption that the individual examination is a more reliable measure of intellect than the group scale or is a closer approximation to an absolute criterion. In view of the fact that the group scales employ somewhat the same material adapted to group use, testing the validity

<sup>5</sup> Lowell, Frances. "A group intelligence scale for primary grades." *Journal of Applied Psychology*, 3: 215-47, September, 1919.

<sup>6</sup> Holley, C. E. *Mental tests for school use*. University of Illinois Bulletin, No. 28, March, 1920, pp. 1-91.

<sup>7</sup> Pressey, L. W. "A group scale of intelligence for use in the first three grades: its validity and reliability." *Journal of Educational Research*, 1: 285-94, April, 1920.

<sup>8</sup> Pressey, S. L. "Suggestions looking toward a fundamental revision of current statistical procedure as applied to tests." *Psychological Review*, 27: 466-72, November, 1920.

<sup>9</sup> Kelley, T. L. "The reliability of tests." *Journal of Educational Research*, 3: 370-9, May, 1921.

of one scale by its agreement with another is not particularly satisfying.

The correlations with the teachers' estimates are given in Table II.

TABLE II. CORRELATIONS WITH TEACHERS' ESTIMATES

TEST	FIRST GRADE		SECOND GRADE		AVERAGE
	SCHOOL A	SCHOOL B	SCHOOL A	SCHOOL B	
Pressey . . . . .	0.78 $\pm$ 0.05	0.74 $\pm$ 0.06	0.16 $\pm$ 0.13	0.60 $\pm$ 0.08	0.57
Myers . . . . .	0.70 $\pm$ 0.07	0.24 $\pm$ 0.12	0.68 $\pm$ 0.07	0.43 $\pm$ 0.12	0.51
Dearborn . . . . .	0.61 $\pm$ 0.08	0.71 $\pm$ 0.07	0.49 $\pm$ 0.10	0.71 $\pm$ 0.07	0.63
Haggerty . . . . .	0.46 $\pm$ 0.11	0.58 $\pm$ 0.08	0.48 $\pm$ 0.10	0.60 $\pm$ 0.08	0.53

The correlations with the Pressey test are considerably higher than those reported by Holley, which were  $0.42 \pm 0.04$  for the first grade and  $0.30 \pm 0.05$  for the second grade. They are higher, except in the second grade, than those reported by Mrs. Pressey, namely 0.66 for 148 primary-grade children and 0.62 for 57 six-year-olds.

Aside from the Pressey test in the second grade of School A and the Myers test in the first grade of School B, the correlations are high and do not differ greatly. The Pressey test gives the best results with the first grade but does not seem so well adapted for the second grade. The Dearborn test, which has limitations as to cost, difficulty of administration and scoring, and lack of interest by children, nevertheless gives the best results on the average for both grades.

In view of the differences in the results, it became a matter of interest to determine the intercorrelations between the tests. They are given for each school and grade in Table III. In each case these four coefficients are averaged and entered in the lower left-hand half of the table.

The rather low intercorrelations indicate that the tests measure different phases of ability. This suggested the possibility of combining two or more tests into a team with the prospect of raising the coefficients with teachers' estimates. Combining all four tests, the scores being weighted so as to give approximate equality to each test, gave the following results for the first

TABLE III. INTERCORRELATIONS BETWEEN THE DIFFERENT TESTS

	PRESSEY	MYERS	DEARBORN	HAGGERTY
Pressey . . . . .		0.69 0.37 0.44 0.43	0.50 0.77 0.29 0.75	0.30 0.69 0.24 0.60
Myers . . . . .	0.48		0.62 0.53 0.65 0.53	0.33 0.21 0.28 0.69
Dearborn . . . . .	0.58	0.58		0.82 0.67 0.27 0.72
Haggerty . . . . .	0.46	0.38	0.62	

grade: School A, 0.79; School B, 0.65. The corresponding coefficients for the second grade were: School A, 0.71; School B, 0.69. The average of these four coefficients is 0.71.

It is noteworthy that this team of tests did not give as satisfactory a result in the first grade as the Pressey test did alone. In the second grade the Dearborn test in one school gave a better correlation than the team. The average result, however, for the four classes is very distinctly better than with any single test. It is better than any two of the tests combined, as is shown in Table IV. The average results, however, are distinctly better with a pair of tests than any single test.

TABLE IV. CORRELATIONS WITH TEACHERS' ESTIMATES FOR VARIOUS PAIRS OF TESTS

PAIRS OF TESTS	FIRST GRADE		SECOND GRADE		AVERAGE
	SCHOOL A	SCHOOL B	SCHOOL A	SCHOOL B	
Pressey-Myers . . . . .	90	53	63	60	66
Pressey-Dearborn . . . . .	81	75	86	71	66
Pressey-Haggerty . . . . .	71	88	43	63	66
Myers-Dearborn . . . . .	83	49	66	71	67
Myers-Haggerty . . . . .	63	50	71	55	60
Dearborn-Haggerty . . . . .	60	69	58	63	62

It is difficult to draw definite conclusions from the above data. Success in school work, on which teachers' estimates of ability are likely to rest, depends on many other factors in addition to intelligence so that checking the value of intelligence scores by their agreement with teachers' estimates or scholastic ratings is at best uncertain. Moreover, the method requires the assumption that

the teachers' estimates are a perfect criterion, which they are not. The test which agrees best with teachers' judgments is not, then, necessarily the best measure of intelligence. Other criteria of validity must therefore be used.

#### DISCRIMINATIVE CAPACITY

Other things being equal, that test is most useful which segregates most clearly and unambiguously different age or grade groups. The larger the difference between the averages or medians of six year olds and seven year olds or between first-grade and second-grade children, the better the test for classificatory purposes. More important than the difference between the central tendencies of two age or grade groups is the variability in each group. The smaller the coefficient of variation or the smaller the percent of overlapping between successive years, the greater the discriminative capacity and usefulness of the test. For practical purposes in these respects a comparison of grade groups is more useful than a comparison of age groups.

An inspection of the curves in Figures 1 to 4 shows the overlapping between the grades and indicates that from this point of view the Myers test is distinctly inferior to the other three. The facts are shown better by the percent of first-grade children who reach or exceed the median of the second grade—Pressey 12 percent, Myers 14 percent, Dearborn 6 percent, and Haggerty 10 percent—and by the percent of second-grade children who fail to reach the median of the first grade—Pressey 6 percent, Myers 20 percent, Dearborn 10 percent, and Haggerty 8 percent. The averages of these percents as the best indices of overlapping are as follows: Pressey 9 percent, Myers 17 percent, Dearborn 8 percent, and Haggerty 9 percent.

Another method of measuring discriminative capacity (and this is the method which Holley used) is to determine for each scale the differences between the grade medians and the probable errors of the differences, and to render these differences comparable by dividing the probable errors of the differences by the differences themselves. This gives a coefficient of variability.

The smaller this coefficient the more discriminating the test. The facts for the four tests, being the differences between the grade medians, the probable errors of these differences, and the resulting coefficients of variation, are given in Table V.

TABLE V. DATA ON THE DISCRIMINATIVE CAPACITY OF  
FOUR TESTS

TEST	DIFFERENCE BETWEEN MEDIANs	P.E. OF EACH DIFFERENCE	COEFFICIENT OF VARIATION
Pressey . . . . .	14.5	2.12	0.146
Myers . . . . .	11.5	2.01	0.175
Dearborn . . . . .	12.5	1.06	0.084
Haggerty . . . . .	27.5	2.00	0.073

These data confirm the conclusion, which might be reached from an inspection of Figures 1 to 4, that the Dearborn and Haggerty Tests segregate the first-grade children from the second-grade children considerably better than the other two tests.

#### CHARACTER OF THE DISTRIBUTION CURVE

The validity of a scale has been tested by the conformity of the scores to the normal distribution curve. A group scale to have discriminative capacity must be of such difficulty as to register individual differences clearly for any year or grade. A markedly skewed distribution with many failures or very low scores or with many perfect or very high scores would be useless. While there is nothing sacrosanct about the normal distribution curve, other things being equal, the test that approximates most closely the normal distribution is, perhaps, the best.

Pressey attacks vigorously the notion that conformity to the normal curve is evidence of the validity of a scale for practical purposes of classification. The validity of a scale as a measure of general intelligence is a different matter from the value of the scale for practical purposes of diagnosis and classification. For practical purposes a scale would be most useful if it "sets off the potential failures at the bottom and the assured successes at the top and spreads out the questionable cases in between." The dis-

tribution in fact, to be desired, is bimodal, not normal. Kelley similarly says conformity to the normal distribution is utterly inadequate as a test of reliability.

There is much to be said for measuring the value of a scale by its success in accomplishing some specific purpose rather than by its conformity to some theoretical standard. It is doubtful, however, whether a test of general intelligence could be devised that would give a bimodal distribution. Certainly from all we know of the distribution of mental traits it would be unique.

The number of cases in this study is not sufficiently large to compare the distribution curves satisfactorily but an inspection of Figures 1 to 4 and Table I shows fairly close conformity to the normal curve except in the case of Myers test.

#### ADMINISTRATION AND SCORING

It is clear from the above data that there are no very striking differences between three of the scales. None of the three is a perfect measuring instrument but each gives information that is well worth while securing. In view of the fact that there is no outstanding superiority of one test over the other two, the factors of each of administration, time of scoring, and reactions of pupils will have weight with teachers and superintendents. According to the examiner's reports, the Pressey test ranks high in these respects since it can be given in twenty-five minutes and scored in three minutes. The Haggerty test also ranks high as it can be given in thirty minutes and scored in five minutes. Both hold the attention of children reasonably well. This is noticeably true of Haggerty's test. The Dearborn test, which ranked high in the tests applied, is long and requires that it be given in three sections. It takes about fifteen minutes to score. In administration, it requires preparation, care, and skill on the part of the examiner, and is fatiguing and boresome to many of the children, especially in the first grade.

## EDUCATIONAL MEASUREMENT AS A KEY TO INDIVIDUAL INSTRUCTION AND PROMOTIONS

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*Superintendent of Schools, Winnetka, Illinois*

Time has been the one measurable factor in education until recently. Consequently, we have laid out our educational system in terms of time units. These have been constant, while the achievement of the pupils within these time units has varied according to individual ability. But with the development of the achievement test movement, it is becoming possible to reverse this order. We may now make units of achievement the constant factor, varying the time to fit the individual capacities of the children.

Educational measurements as now known to most of us, however, are not yet sufficiently developed to enable us to make the complete change in our schools which is implied by variable time units and constant achievement units. Yet the movement toward this change is unmistakable, and in the schools of Winnetka we have been experimenting for the past three years on the possibility of making the change complete. Whatever the crudities of the detail in our procedure, we have demonstrated the practicability of a shift from time units to achievement units. We have for nearly two years succeeded in making all of our promotions individual and on the basis of achievement rather than of time.

The firm hold of the time unit upon our educational system dates back a long way, but has grown especially strong with the development of graded city schools. As a consequence of making time the constant factor, rapid pupils either acquire habits of comparative idleness and work below their ability, or are pushed ahead a grade, losing much valuable intermediate instruction; slow pupils are either advanced with inadequate foundation or are retarded abnormally by grade repetition. A scheme which does not take advantage of the natural alertness of the bright

pupils and which clogs the system with repeaters is financially and educationally wasteful. The faults which result from the class lockstep are too well known to need discussion. We all earnestly wish to abandon this system, but we have not heretofore found a safe method of doing so.

Before educational measurements were developed several attempts were made to individualize instruction and promotions. The best known of these were the Pueblo, Colorado plan, developed by Preston Search about thirty years ago, and the San Francisco State Normal School plan developed by Frederic Burk about ten years ago. Neither of these made time the constant factor; nor had they developed the technique of making achievement units the constant. Instead, they had work units. Each pupil had a certain amount of material to go through—a number of pages to read, a number of exercises to fill out, or a number of problems to work. Tests at the end of this work were of a sampling character, neither complete nor diagnostic. The difficulty of keeping up with the practice work and checking the assignments of the children was such that these systems failed to spread as rapidly as their merit deserved. The San Francisco Normal School plan was far in advance of the Pueblo plan because the material was well organized and specially prepared for the children. But until about four years ago this plan was such that small classes were strictly necessary, in order to make it administratively feasible.

Rural schools have always been individual in the same sense that the Pueblo plan was individual. Pupils could advance at their own rate, but each child went through the same work reciting on it orally to the teacher, or being tested by the random sampling process. The same is true of the high school plan of Dalton, Massachusetts.

With the ability to measure educational achievement accurately a new type of individual instruction and promotions has come into existence. The San Francisco State Normal School was one of the first institutions to undertake a systematic development of the measuring movement towards an administrative solu-

tion of the class lockstep problem. The methods which I shall describe below as the Winnetka plan had their inception at the San Francisco State Normal School under Frederic Burk. Much of what Winnetka is doing is closely paralleling the recent developments in this school.

In undertaking to introduce individual promotions and instruction in the Winnetka Public Schools in 1919 we were confronted by the inadequacy for our purpose of most of the standard tests on the market. They had been constructed largely from the standpoint of supervision. "Measure the efficiency of the entire school, not the individual ability of the few," was, and still is, the published motto of the author of some of the best tests. We wanted to reverse this procedure, and to measure the individual, not the school. For this purpose we found that we had to develop tests and measurements further than they had yet been developed. It became necessary to make each test cover completely the subject that was being tested, in such a way that a diagnosis of the difficulties of the individual pupil was easy for any teacher. Moreover, it was also necessary to prepare practice material which would correspond with each topic or process contained in the test so that a pupil might practice on his own specific weakness. It was desirable that this material should be as nearly as possible self-instructive, so that pupils could use it with the minimum of help from the teacher.

Before either tests or practice materials could be prepared it was necessary to establish our units of achievement. We call these units, "goals." Wherever possible we established them upon the basis of research already done. In many cases, however, where research was lacking, we used our best judgment in establishing temporary goals, and proceeded to undertake investigations which would gradually replace these temporary standards by others scientifically established. This is a long, slow process and is still in its early stages. Space in this article will not permit a discussion of these investigations. They will, however, be published from time to time as they are completed.

Before discussing the place of these achievement units in the Winnetka plan, it should be made clear that they represent only a part of the curriculum. An equally important part consists of what we call "social work." The social part of our work is not measured. It consists of that range of subject matter to which we wish to expose our children, but which they need not master, and of opportunities to enter into group undertakings which will develop the children's ability to co-operate with one another. The social part of our work is not "socialized recitation," because there is no recitation in it—children are not being tested on what they have studied. They are not re-citing. They are neither marked nor promoted on this basis. Social work consists of class discussions, group projects, dramatizations, special reports, group games on the playground, assemblies, group singing—all activities in which the group acts as a whole and in which each child is contributing his share to the group. The social work in the Winnetka Schools occupies from one-third to one-half of each school day, and is as important a part of the curriculum as the individual work. We have more opportunity for children to express themselves and to develop social attributes than systems which use the class recitation, because the individual work on minimum essentials economizes the children's time. The social work is also freed from the incubus of discovering whether or not children have studied their lessons.

The achievement unit takes the place of the time unit in the individual work on minimum essentials. Children's marks and promotions are based entirely upon individual work. There are no recitations; there is no grade repetition; there are no failures; there is no skipping. No child is held back to a slower rate of progress than is natural to him; none is forced forward too rapidly for thorough work. Each "goal" must be achieved by each pupil before he can go on to the next goal.

Instead of reciting the children practice and prepare themselves for achievement tests. The teacher instead of listening to recitations passes about among the children, helping them in the preparation of their materials, developing new work with small,

informal, temporary groups of children who happen to be ready for the same instruction at the same time, and helping each child to work independently toward a definite end.

The plan is made administratively possible by the achievement tests corresponding to each goal in each subject and by practice materials which the children themselves can correct and which enable them to get ready for these achievement tests.

It has been necessary to prepare a complete series of achievement tests in arithmetic and language. None of the published tests in these two subjects were sufficiently detailed and diagnostic for individual instruction. The nearest approaches are the Courtis and Woody so-called diagnostic tests in arithmetic, and the Pressey achievement tests in language. Courtis or Woody may show us that a pupil is weak in addition or even that he is weak in column addition. Neither of them, however, will show us what particular combinations he is missing, so that he may correct his individual defect. They may show us that a child is weak in simple multiplication, but they will not show us whether the difficulty is in carrying or in lack of knowledge of the multiplication facts. Neither will they show us in which particular facts or carrying combinations the pupil is making his failures. The Pressey language tests do not as yet completely cover the minimum essentials of punctuation and capitalization, nor are the answers so keyed that it is possible for the pupil to practice on the particular error which he has made. These statements are unfair if taken as criticisms of the Pressey, Woody, or Courtis tests. Those tests are for the most part avowedly to test the school or the group, rather than to diagnose the specific difficulty of each individual. For our purposes, however, and for any school which wishes to make units of achievement the constant factor in place of units of time, it is necessary to have specifically diagnostic tests for each achievement unit.

The preparation of the tests we are using in Winnetka was begun by the faculty of the San Francisco State Normal School while the writer was director of tests and measurements at that institution. It has been continued by the Winnetka teachers dur-

ing the past three years. The criteria to which each test must conform are: (1) it must cover completely every detail of the unit tested—*e.g.*, an addition test must include every combination, a short division test every type of difficulty, etc.; (2) the test must diagnose readily the exact weakness of each pupil in so far as this weakness is a lack of knowledge or ability; (3) the test must be strictly objective and easily corrected; (4) the answers must be so keyed that the pupil can readily turn to corresponding practice material and make up his deficiencies.

The preparation of practice materials to correspond with these tests has been a very considerable task. It has been done co-operatively by groups of teachers, their work being mimeographed and distributed to the pupils. The practice materials have had to conform to the following criteria: (1) they must be readily intelligible to the children themselves, self-instructive so far as possible; (2) they must take up just one new thing at a time, providing ample practice in that new element before the next element is discussed; (3) they must be self-corrective, *i.e.*, they must be provided with answer sheets or other devices so that the child can correct all of his own practice work; (4) they must lead up to practice tests which shall be alternate forms of the regular test, so that a child can determine for himself whether or not he is ready for a regular test; (5) they must be arranged to correspond with the arrangement of the tests, so that a pupil may readily find the practice exercises corresponding with any error made in a test.

While we have prepared a series of tests and practice books for all grades in arithmetic and language (including grammar), we have not had to do so in reading and spelling. The Burgess Picture Scale test in silent reading makes it possible to measure the children's achievements in this subject with considerable accuracy, as does the Gray Oral Reading Test in oral reading. The Anderson Spelling List as arranged in the Iowa Scale makes the measurement of achievement in spelling definite and simple.

In the first two grades, however, it has been necessary to prepare special devices and tests for reading. Descriptions of these

will be published as they are perfected. Above the second grade a pupil reads fifteen books of average length and difficulty for each grade. He then takes the Burgess and Gray Reading tests. If his achievement is equal to the standard achievement of the next grade above, he is promoted to that grade. We are working on exercises to increase comprehension where this is low, and to increase speed where the child reads too slowly. We have undertaken a rather elaborate investigation of books for children, hoping to standardize them according to difficulty and merit.

Our procedure in spelling consists in dictating all the words for the grade at the beginning of the year, twice through. Those words which a pupil misses are checked in his individual speller and become his course of study for the year. In the back of his speller are blanks for words misspelled in his written work which also become part of his course of study. Pupils dictate to each other in pairs and correct their own daily work. Once a week they dictate the week's words to each other, giving these papers to the teacher for correction. Words spelled correctly on a weekly review test are not again studied or tested until the beginning of the next semester. In September and February there are semester review tests in which pupils dictate to their partners all the checked words in the partner's speller, the papers being corrected by the teacher. Words spelled correctly on these semester review tests do not have to be studied and will not be retested until the next semester review test. A word spelled correctly for four semester review tests is permanently removed from the pupil's course of study in spelling.

The effect of concentrating the pupil's attention on the words which he has misspelled has been to increase the general level of the children's spelling ability in Winnetka, until our grade medians are now from one to two years above the standards of the Iowa Scale. Likewise our individual method of teaching reading has resulted in grade medians from one to two years above the standards for the tests used.

History and geography are social subjects to a very considerable extent. There is, however, a certain essential body of

facts, which every child should know and which therefore should be individualized. We are undertaking, with the help of the Commonwealth Fund in New York, an extensive investigation as to what these facts are; and we hope ultimately to develop a technique for handling them which will not deprive history and geography of their social value nor result in lack of thoroughness in respect to the body of essential facts in each of these subjects.

Writing is individualized by means of a device for measuring the uniformity of slant, height of letters, position on line, non-interference of loop letters below the line with letters on the line below, speed, and legibility. Each of these is measured objectively by the pupils themselves as well as by the teachers, and pupils keep definite records of their improvement from day to day in the particular elements in which they are weakest. A transparent celluloid card four by six inches ruled the long way with twelve lines to the inch is used for measuring uniformity of slant, and height of small and tall letters.

Special subjects are also expressed in terms of definite units of achievement. Cooking, sewing, and general science all lend themselves readily to this system.

To make the operation of this individual work concrete, let us consider for a moment what you would find if you were to step into a fifth-grade room in Winnetka some morning when most of the children were studying language. You would find one child working on the latter part of his fourth-grade language book. Another might be beginning his sixth-grade language work. Most of the children would be scattered through different parts of the fifth-grade work. If you were to watch one of these you would see that he has before him a mimeographed practice book. He is seen to read first the development material on, say, "Commas in Series." He then practices writing sentences containing series, placing commas in their proper places, referring to the answers in the back of his book, and correcting his own work. After this specific practice in commas in series he takes a practice test. This is a part of his practice book and consists of a paragraph with all capitals and punctuation omitted;

it requires knowledge of every element up to and including commas in series. He copies this paragraph in the correct form, and compares it with the correct copy in the answer part of his book. This correct copy is keyed to show in what elements the child is weak. A sample test and keyed answer sheet is reproduced herewith.

FIFTH GRADE LANGUAGE BOOK—p. 8.

Cumulative Practice Test—16-A

a walk in the woods

one day marys mother told her she might ask frances mother to let her go nutting the girls mothers packed a lunch for them and off they started it was a sunny october saturday the girls lived in winnetka illinois dont you think the childrens holiday was a happy one they met mr jones and he walked home with them. The girls brought nuts bright leaves and fall flowers.

Cumulative Practice Test—16-A—Answer Sheet

A Walk in the Woods.  
 $\frac{7}{7}$     $\frac{7}{7}$

One day Mary's mother told her she might ask Frances's mother to let her go nutting. The girls' mothers packed a lunch for them and off they started. It was a sunny October Saturday. The girls lived in Winnetka, Illinois. Don't you think the children's holiday was a happy one? They met Mr. Jones and he walked home with them. The girls brought nuts, bright leaves and fall flowers.

16

Analysis:

Goal 1....4 times.	Goal 9....1 time.
Goal 2....1 time.	Goal 10....1 time.
Goal 3....1 time.	Goal 11....1 time.
Goal 4....6 times.	Goal 12....1 time.
Goal 5....2 times.	Goal 13....1 time.
Goal 6....2 times.	Goal 14....1 time.
Goal 7....1 time.	Goal 15....1 time.
Goal 8....2 times.	Goal 16....1 time.

If he finds that he has forgotten his apostrophe for contractions (9), he turns back to section 9 of his practice book and practices on that and on each other error that he has made, and then asks the teacher for a test. This test is another form of

the practice test. After taking the test, he hands it to the teacher for correction. The next morning she returns it to him with all the errors marked. He turns back to his practice book and practices specifically on each point missed, and then gives himself a second form of practice test which he finds in his practice book. After correcting this, he asks for a second form of the regular test. If he gets it all right, he is marked O.K. in this topic in his "goal book." If he still makes errors, he repeats the first procedure. After receiving an O.K. in commas in series, he proceeds to the next goal, which happens to be "comma in address."

We have spoken of the "goal book." This is an abbreviated course of study stated in terms of specific achievement and placed in the hands of *pupils*.

Moreover, it is sent home monthly in lieu of a report card. Parents therefore as well as pupils know exactly what has to be accomplished and how much has been accomplished. Opposite each page of goals is a page of explanation to the parents.

The language page of the fifth-grade goal book looks like this:

#### FIFTH-GRADE LANGUAGE GOALS

1. Period—end of sentence .....	13. Comma—city, state .....
2. Period—abbreviation .....	14. Apostrophe—"Boys'" .....
3. Question Mark .....	15. Apostrophe—"Children's" .....
4. Capital—begin sentence .....	16. Comma in series .....
5. Capital—place .....	17. Comma in address .....
6. Capital—person .....	18. Comma—yes, no, Oh, .....
7. Capital—title .....	19. Simple quotation .....
8. Apostrophe—"John's" .....	20. Exclamation point .....
9. Apostrophe—contractions .....	21. Capital for Diety .....
10. Capital—Mr., Captain Smith, etc. .....	22. Paragraphs .....
11. Capital—day of week .....	23. Use of Dictionary .....
12. Capital—months .....	24. Review .....
Course begun.....	192....
Promoted to Grade VI Language.....	192....
.....	.....

Teacher

The arithmetic page of the fifth-grade goal book is shown below. "Speed" means the number of examples of standard difficulty worked in three minutes; "accuracy" is the percent correct.

## FIFTH-GRADE ARITHMETIC GOALS

Addition review—	Multiplication of fractions—
Speed 5, Accuracy 90%.....	Speed 4, Accuracy 90%.....
Subtrac. review—	Division of fractions—
Speed 9, Accuracy 90%.....	Speed 4, Accuracy 90%.....
Simple Multip. review—	Decimals—values, addn. &
Speed 3, Accuracy 90%.....	sub.—
Compound Multip. review—	Speed 4, Accuracy 100%.....
Speed 5, Accuracy 90%.....	Decimals, frac. to dec., &
Short Division review—	mult.—
Speed 10, Accuracy 90%.....	Speed 4, Accuracy 100%.....
Long Division review—	Decimals—division—
Speed 2, Accuracy 90%.....	Speed 4, Accuracy 100%.....
Addition of fractions—	Decimals—short cuts—
Speed 4, Accuracy 90%.....	Speed 10, Accuracy 100%.....
Subtraction of fractions—	Problem Solving .....
Speed 4, Accuracy 90%.....	Measurements .....
Course begun.....	192....
Promoted to Grade VI Arithmetic.....	192....
	.....

Teacher

The grouping of children in rooms is in accordance with their general advancement. There is nothing to prevent a child in one room from working on fifth-grade language and sixth-grade arithmetic at the same time. A child does not change rooms each time he receives a promotion. Room groupings are usually changed once a year, but no general rule is necessary. The individual work makes it possible to fit each child with that group to which he seems to belong. Very precocious children are usually placed in a room with children of an age which corresponds with the average of the chronological and mental ages. Most attempts to give precocious children the type of school work which they need brings them into social contact with classmates who differ markedly from them in every quality except intellectuality. The flexibility of the system we are now using at Winnetka obviates this difficulty. Other things being equal, however, children are placed in a room with other children who are doing approximately the same grade of work in most subjects. The most important factor in grouping children is their social work in which they have to co-operate with one another.

One of the outstanding features of the Winnetka plan of individual work is that each step toward its establishment is a

step worth while in itself, perfectly safe for any superintendent to take in any school system. The first of these steps is the establishment of definite goals or subject-matter units. This is a natural outgrowth of the educational measurements movement. The second step is also a development of the same movement—the preparation of tests which will completely cover each subject-matter unit and diagnose the difficulties of each individual child. The third step is the preparation of self-corrective practice materials which will at once prepare for these tests and enable a child to make up the deficiencies shown by the tests. When one has taken these three steps there is no difficulty whatever in placing an entire school system on an individual basis. Achievement units become the constant factor almost automatically. For after all, the time unit is the arbitrary one, the achievement unit the natural one. When achievement replaces time as the constant factor in our school systems, we can promote children individually by subjects and fit our public schools to the needs of the individual child.

## QUALITIES RELATED TO SUCCESS IN ELEMENTARY SCHOOL TEACHING

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What facts concerning a candidate for a teaching position are of prognostic value? Of a hundred graduates of a normal college quite probably some will make excellent teachers, a larger number will do well, and a few will fail. By what system of interviewing can a superintendent increase his chances of picking more successful teachers and fewer failures than pure chance would account for? What qualities possessed by a candidate and ascertainable by a prospective employer are correlated highly enough with teaching success to be worth considering in a sound selective technique?

The study here reported was undertaken with such questions in mind, the purpose being to contribute statistically dependable facts as to teacher selection. The data were obtained from three school systems in Massachusetts which we shall call A, B, and C. Town A is a community of some 12,000 inhabitants, close to Boston. Town B is a community of about 10,000. The manufacturing interests of these two towns make them above the average "going" communities. Town C is a community of about 8,000, of great historic fame but with interests centering rather definitely in the past. The superintendents of Towns B and C were young men, university trained, with genuine professional interests. The writer was superintendent of Town A. The conditions for examining and testing the teachers were particularly fortunate in that the school boards were not only willing for the superintendents to make such studies but desired it. The investigation was under the direction of Professor E. L. Thorndike of Teachers College, New York.

The basic technique was to correlate ascertainable facts concerning the teachers with the degree of success they were obtaining in actual classroom work. Thus the investigation divided itself into two parts: first, to determine the distribution of teaching ability for each teaching staff; second, to correlate against this distribution the amounts of certain traits or qualities which

the individual teachers possessed. Later the partial correlation formula was used to determine the relation between success in teaching and each trait when other traits were rendered constant.

#### THE DETERMINATION OF VARYING AMOUNTS OF TEACHING SUCCESS

It is clear that we do not need for our purposes measures of teaching skill in absolute amounts. What we want and what we can get is the amount of difference between individual teachers of a staff. If we assign to the worst teacher in the elementary school of Town A a teaching ability of 1, and build up a consistent scale of merit so that the average teacher has, say, an ability of 15 and the best teacher an ability of 27, it is not important whether the arbitrarily chosen 1 represents a very high degree of teaching success compared with all the teaching in the United States or a small amount of skill. What we must have is amounts of difference, defensibly obtained, between members of the group.

The estimation of candidates has been far less serviceable both in industry and in education because employers have been confused in the matter of "amounts of qualities." In physical measurements we have units entirely objective and independent. Thus a teacher may weigh 130 pounds or be 5 feet 2 inches tall, and we know in this case exactly what we mean. But when we say a teacher is "good in explanation," "strong in discipline," or "weak in community interest," we are not so sure of what we mean. For instance, does "strong in discipline" mean a number of units *above* an absolute zero? As a matter of fact qualities, for which we do not have very objective units of measure, are consciously or unconsciously measured with reference to these qualities as people possess them. Strong in discipline means better in discipline than most teachers, I have known—above the average or some such thing. We have to measure many vital traits in this way. We can do it blindly and get comparisons which are very inaccurate and of little use; or we can do it accurately and express differences in mathematical terms so that these differences can be used for finer studies based on correlation. For in correlation it is useful to know not only differences

expressed in verbal adjectives but amounts of differences expressed in mathematical nouns, such as 4 units better in a spread from 1 to 30.

In this study amounts of differences were determined for six teaching groups in respect to general teaching ability. The six groups were the high-school staffs and the elementary-school staffs of the three school systems.

The final ratings for teaching success in each group were the result of the following procedure. We shall use the elementary-school group of Town A as an illustration.

*Mutual ratings.*—Every teacher in the group rated every other teacher for such qualities as (a) general teaching ability, (b) skill in discipline, (c) excellence of professional preparation, (d) ability to handle situations.

Upon prepared sheets containing the names of all the teachers together with columns for the several qualities each teacher rated every other teacher on each trait. The worst teacher in respect to a trait was to be marked 1, the next to be worst 2, and so on. The best teacher was to be rated 56 (there were 56 teachers in the group). Where no difference between two teachers could be discerned, the same mark for both was allowable. If a teacher was unknown to the rater, no mark was to be given. The rater was instructed to leave her rating sheet unsigned, and absolute freedom from any possible embarrassment was guaranteed.

The spread of ratings received was excellent. Only one teacher failed to cooperate. This teacher rated every teacher 1 in all qualities. The average spread was from 1 to 37. This was easily sufficient for building up an order of merit, quantitative in units of amount of difference.

The basis of building up such a scale is Table XXIII of Thorndike's "Mental and Social Measurements."<sup>1</sup> The theory

<sup>1</sup> The technique involved in this procedure is straightforward. The best references to it are: (a) Thorndike, E. L. "The technique of combining incomplete judgments of the relative positions of  $n$  facts made by  $n$  judges." *Journal of Philosophy, Psychology, and Scientific Method*, 13:197-204, April 13, 1916. (b) Knight, F. B. *Qualities connected with success in teaching*. (Teachers College Contributions to Education No. 108 in preparation). (c) Ream, M. J. "A statistical method for incomplete order of merit ratings." *Journal of Applied Psychology*, 5:261-263, Sept., 1921.

is that if 50 percent of a group of judges vote that A is better than B in a certain quality and 50 percent vote that B is better than A, then there is no difference between A and B in respect to the quality. But if A is better than B in the opinion of more than 50 percent of the judges, then A is better than B. The amount of difference depends on the percent of judges voting him to be better. Thus if 75 percent of the judges vote that A is better than B, he is better by 1 unit. If 70 percent of the judges so vote, A is better by 0.78 of a unit. If 98 percent of the judges so vote, A is better by 3.05 units.

Thus by comparing any teacher's ratings with others we can determine her quantitative place in the group. The only arbitrariness here is in giving the worst teacher a value of 1. The one assumption made is that of the competency of the teachers to judge the quality of the work being done. This assumption is justifiable on a common sense basis because after all the good teacher is the one whose associates think he is good, just as the good lawyer is the one whom other lawyers judge to be a good lawyer, or the good doctor is the one to whom other doctors send their patients when they themselves are away. Though teachers rarely, if ever, directly observe each other actually operating in the class, there are many indirect sources of information upon which mutual judgments may be based.

The competency of teachers to rate each other was established statistically in two ways. First, the reliability of their ratings was shown by pooling each of two chance halves of their ratings and correlating these two pooled ratings. This correlation was so high (over +0.9) that ignorance, carelessness, or haste could not have influenced the original ratings to a damaging extent. The second statistical evidence of the worth of teacher's ratings of each other rests upon the fact that these ratings correlated very highly with similar ratings made by supervisors.

*Ratings by superior officers.*—In addition to the mutual ratings of teachers, ratings from the supervisory staff were obtained in the same way. In Town A, for our example, the supervisors'

rating was a pool of the ratings of the superintendent, four full time principals, and four special-subject supervisors.

*Ratings by pupils.*—Where departmental work brought three or four teachers before the same class of students, I had the pupils rate the teachers under circumstances calculated to engender a dignified and serious approach to the task. This method was especially useful in the high schools. Here I asked the principals to give me the names of the twenty most dependable pupils in the school. These twenty students rated their teachers. The correlation between the pooled judgments of pupils with that of the supervisors was about +0.7. Some disagreement was present but may as well have been due to lack of insight on the part of supervisors as on the part of students.

The high correlations between the ratings by teachers, supervisors, and (where possible) students made it clear that an order of merit of individuals composing the teaching staffs had been fairly attained. The final quantitative order of merit was a composite of teacher and supervisor judgments. It was easy to be content with one rating, namely, that for "general teaching ability." For the ratings on specific traits agreed so closely with this summarized rating that evidently the general opinion of a rater in respect to the teachers heavily weighted the ratings for distinct traits.

#### CORRELATION OF SUCCESS WITH OBSERVABLE AND MEASURABLE FACTS

With this criterion of teaching success certain objective data concerning the teachers were related. The results will be indicated.

*Handwriting.*—In another connection samples of the handwriting of every teacher had already been collected. This writing was done under the normal busy conditions of school life. It was in no sense "show" writing but the kind of penmanship customarily used by the teachers. These samples were marked for quality according to the Ayres scale. The correlation between ability to teach and quality of handwriting was found to be zero, *i.e.*, no relationship was discovered.

It would seem as if our prigishness about good penmanship is a bit over-done. A superintendent who discards an applicant's letter because of poor handwriting is using as a criterion of selection a skill which has no evident relationship to success in teaching. This zero correlation of course is not for handwriting in its total range of quality—from stark illegibility to artistic beauty. The range here is quite restricted, for all teachers write fairly well. It is better to say: the differences in quality of penmanship which existed among these teachers bore no relation to differences in teaching skill.

*Age.*—The age in years and months for all teachers was obtained from the official records of the Massachusetts Retirement Board. The correlation with teaching skill was of negligible size. In one group it was slightly negative, in others positive. We know there is *some* correlation between age in general and teaching ability. A five-year-old child could not teach, and excessive old age would no doubt be negatively correlated. But within those age limits during which men and women ordinarily teach, age does not appear to be correlated with teaching skill. The younger teachers are not the best as a current superstition would lead us to think; nor do years of tenure make material additions to skill.

*Experience.*—Experience in teaching is not significantly correlated with teaching ability. My data fail, for example, to show that the first five years of teaching are the best or that after that period a teacher begins to slip—notions that are rather widespread among school administrators. The correlation might have been slightly distorted because of the regulations concerning necessary qualifications for new teachers. Towns A and B engage no teacher unless she has had successful experience for two years in other systems. Thus our range is cut off at the lower end. If teachers doing their first or second year of teaching had been at work in these towns some correlation might have appeared. It should also be remembered that teaching is an extremely selective calling. As a teacher gains experience she tends to go into administrative work in proportion as she is possessed of qualities

of leadership and general ability. Superior teachers also tend to go to larger cities where salaries are higher and where the social life is more attractive. These two facts—namely, that no inexperienced teachers were hired and that stronger teachers tend to leave class-room teaching in smaller communities—may help to account for the absence of relationship between amount of experience and amount of teaching skill. At all events, in these towns no correlation exists. Moreover, the probable error due to scanty data is negligible for in this correlation there are over 150 cases.

*Professional study during service.*—The amount of summer school and Saturday work in educational courses was ascertained for each teacher. A useful relationship between amounts of this kind of study and skill in teaching could not be established. I am confused by this absence of relationship. It would seem that summer school study would be indulged in more frequently by good teachers than by poor teachers. Even if information gained in such study did not function directly in the class room, one might nevertheless hold that a correlation between study and skill in teaching exists. For it would seem reasonable to expect that a teacher who has ambition enough to go to summer school would also tend to be a vigorous and alert teacher in the class room. However no such relationship was found. The zero correlation could not be accounted for by absence of spread in either distribution for we had a good spread in our order of merit in general teaching ability and also in the amount of summer school work.

*Mental test.*—In Towns A and B all elementary-school teachers were given a mental test one hour in length. This test was the first hour's work of Thorndike's College Entrance Examination, Forms K and J. As would be expected the 120 cases were spread out from very low to very high scores. The correlation with teaching ability in both groups was slightly positive; but it was so low that zero came within the probable error.

It is evident that a mental test is not a good selective device as far as elementary-school teaching is concerned. We should bear in mind, however, that all the teachers involved in this

study were in the upper portion of the total range of intelligence. Obviously an idiot could not teach. These teachers had enough intelligence to go through high school and normal school. What this correlation means then is "given enough intelligence to pass through high school and normal school as a minimum possessed by all," then more intelligence does not seem to function in the practical situation.

Of course one can use any amount of intelligence even genius in elementary-school teaching, but other factors such as interest in children, persistence, *savoir faire*, also operate; and in the general shuffle, differences in intelligence tend to be lost. It is also quite possible that abler teachers leave teaching in elementary schools for supervisory or other work. Too little intelligence would be a handicap. Too much intelligence might also be a handicap. A too active mind might well be so constantly aware of unsolved problems—methods, devices, changes theoretically possible but practically inadvisable—that superior intelligence would get in its own way in the rather humdrum and steady grind of elementary-school teaching.

*Normal school standing.*—In computing the prognostic value of a student's success in normal school in relation to success in teaching one assumption had to be made which may have been a little risky, namely, that an "A" from one normal school denoted scholarship equivalent to that denoted by an "A" from another normal school. The equivalence of marks, standards, quantity and quality of work of the normal schools cannot be proved. It should be said, however, that this equivalence is generally admitted by school superintendents in New England. Half of the normal schools in my study were supervised from the same office. Frequent conferences, interchange of instructors, and approximately equal support are among the factors tending to make the assumption of equal standards allowable.

Another assumption that was necessary was that marks meant the same thing in different years. Thus an "A" in English in 1906 was assumed to be equivalent to an "A" in English in 1910. As instructors change there is doubtless some variation in the

true meaning of "A" or of any other mark. The value of an "A" in English as compared with an "A" in, say, Art was taken care of by getting all the marks given in any subject and assigning numerical values to the letters in terms of the standard deviation from the central tendency.

To get enough cases of elementary-school teachers with normal-school records complete and from normal schools approximately alike it was necessary to pool the teachers of Town A and Town B. Here we assumed that the median teacher of Town A was equal in teaching ability to the median teacher of Town B. As the spread of merit of these two groups was about alike and as these two towns were similar in important facts such as size, type of community, salary schedules, requirements for beginning teachers, courses of study, and supervisory provisions, this assumption was not at all a violent one. This allowed me to use over 50 cases in the correlation. The correlation between "how well a prospective teacher does in normal school and how well she does in teaching" was practically zero.

This zero correlation means that if a normal-school student does well enough to pass, added excellence in normal-school work does not prophesy unusual excellence on the job. Anyone who is intimately acquainted with elementary school teaching will not be surprised at this correlation. Factors not effected very much by formal study effect very seriously actual teaching success. With a sufficiently minute course of study, with able and persistent supervision, a teacher can soon make up what a "C" instead of an "A" in normal school implies.

*Knight-Franzen Trade Test for Elementary School Teachers.*

—A trade test of elementary school technique and information was constructed. This test is supposed to measure the amount of intimate knowledge concerning elementary school teaching and allied information which is possessed by the individual taking the test. We know that it is not a disguised intelligence test for it does not correlate with scores on intelligence tests. It does measure something related to school teaching for teachers as a group score more highly than do students of equal age and ability

who know nothing about teaching. Thus a group of young elementary school teachers normal-trained and with a year or two experience do much better than a group of advanced law students or students of salesmanship and advertising.

This test was given to the elementary school teachers of Town A and Town B. The correlation between general teaching success and scores on the trade test was +.5. Of all the instruments for estimating teaching success including mental tests, experience, normal school record, summer school study and the trade test, the trade test was the only instrument to turn in a positive correlation of sufficient size to be really useful for purposes of selection. This test is now revised and data on its prognostic value is being gathered in the elementary school group of Des Moines, Iowa.

The findings of this study lead one to wonder how much better than chance the selective skill of the average superintendent is. As far as I know we have on record no correlation between how well a superintendent thought teachers would do and what they actually did. In other words, the correlation between successful candidating and successful performance is unknown. The kind of information usually asked of a candidate does not correlate according to my data with successful performance. In spite of the fact of the complexity of the trait, "general teaching ability," our correlation of +.5 between it and a trade test carries the definite hope for a genuinely scientific procedure of teacher selection in which photographs, conversations, letters of recommendation may weight the decision less heavily and some use of the Trade Test technique be of very definite help.

## SOME USES FOR INTELLIGENCE TESTS<sup>1</sup>

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Another promising offspring of modern psychological science is the standardized intelligence test. In the hands of practical men intelligence tests are proving themselves to be practical tools for practical purposes. During the war they were used to obtain leaders of men for the army; large industrial concerns are using them to pick young men and women to be trained for executive positions; great universities are using them in lieu of entrance examinations to select students; social welfare organizations are using them to discover feeble-minded individuals who menace society as potential or actual criminals; live teachers and educational administrators are using them for various purposes. We have heard much of them during the last three or four years. Are we all getting our share of the help they offer us?

I do not propose to enter into a comprehensive discussion of the nature of intelligence tests, the need for them, their reliability, or the uses to which they may be put. All this has been set forth at length and in a clear and readable manner by Professor Lewis M. Terman to whose book, *The Measurement of Intelligence*, published by Houghton Mifflin Co., I refer all readers desirous of a full discussion of intelligence testing in general and of the Binet-Simon Intelligence Scale in particular. My own purpose is merely to describe why and how we have put intelligence tests to some practical uses in the schools of my district.

I shall, however, refer for a moment to the need for some method of measuring objectively the relative mental abilities of pupils in the schools. This need is not generally felt even among teachers and schoolmen. Some of the teachers, whom I convinced with comparatively little difficulty of the need for standardized tests for measuring the progress of pupils in their studies,

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<sup>1</sup>This is the eighth article by Superintendent Brooks on the general topic, "Putting Standardized Tests to Practical Use in Rural Schools."

were inclined to scoff at the idea of intelligence tests. Their attitude may be expressed in the words of one teacher of many years' experience who said with a decided air of assurance, "I guess I can tell the bright children from the dull ones without the help of any intelligence tests." Just before giving the intelligence tests in the school of this particular teacher, I asked her to write down for me the name of the brightest pupil in each grade according to her best judgment.

As might be expected, and as events proved, her estimates were right or nearly right in some cases and entirely wrong in others. As an example of being wrong, she selected as the brightest pupil in grade IV, a twelve-year-old girl of small stature who led her class in achievement. Now it must be perfectly obvious to anyone who considers the matter seriously that it would be a very unusual thing to find a mentally superior child of twelve years, or even a mentally normal one of that age, in the fourth grade. But the teacher had neglected the age factor in making her estimate of this child's mental ability and had rated her as a very bright child simply because she was doing the best work of any pupil in her class. The fact that the child was small for her age and so did not tower above her classmates of nine and ten probably helped out the delusion. If this girl had been placed in a class of normal twelve-year-olds she would have been recognized at once as a dull pupil—a fact which the mental tests at once disclosed. She had a mental age of 10 years, 2 months, and an Intelligence Quotient of 80. In reality the brightest child in the fourth grade proved to be a little girl of 8 years, 6 months whom the teacher estimated as "just average." This girl had a mental age of 10 years and an Intelligence Quotient of 118. Among pupils of her own age she would have been a shining star. The teacher's errors of judgment were due to the fact that because of their ages the first girl was working a little below capacity and the second a little above capacity. Teachers and others are too prone to estimate a child's mental ability by comparing the amount and quality of his work with those of the other children in his grade regardless of how much

he may be advanced or retarded. If the child happens to be in the normal grade for his age, her judgment may be fairly accurate; otherwise it is likely to be inaccurate. Personal judgment in such matters must be replaced as far as possible by scientific measurement.

Furthermore, intelligence tests are needed to help refute a common fallacy which is almost unbelievably widespread in the educational world as well as outside it—the fallacy that under proper conditions and with proper instruction every child barring the obviously feeble-minded is about equally capable of making satisfactory progress in any study. This idea is echoed in our Declaration of Independence which offers as a self-evident truth that "All men are created free and equal." It is re-echoed in the rabid mouthings of I. W. W.'s proclaiming the equality of men. It is the precept and guide of the teacher who wastes her time and the time of the brighter children of a class while she holds them back and tries desperately to help one or two mentally deficient classmates keep up with the rest.

Only a short time ago the principal of one of the oldest and most famous academies in New England spent nearly an hour assuring me most vehemently that there was absolutely no reason in the world why, with proper instruction and sufficient interested effort, one student could not do just as well as another in Latin, history, algebra, or chemistry, and this in face of the fact that he admitted he had never been able to achieve such ideally uniform results in any of his classes. I gathered from his talk, however, that the failure was not due in any measure to inadequate instruction, but entirely to widely varying degrees of interest, industry, and application on the part of his pupils. He was cocksure and eloquent. I was so amazed at his attitude and so overwhelmed by a torrent of timeworn, dogmatic and, to him, unassailable arguments upholding his contention, that I could offer but a feeble reply. I am convinced that he went away with the firm belief that I was some new variety of incurable crank.

Now any one with common sense, who will forget proverbs and doubtful platitudes long enough to give his common sense

time to function, can readily see that men are not born equal. Perhaps they should be, but they are not. They are not born equal mentally, physically or financially nor even with that democratic equality of opportunity of which we hear so much. We have all extremes mentally from the driveling idiot to the genius, physically from the bedridden cripple to the physically perfect human being, financially from the pauper to the millionaire. Financial inequality may be more or less overcome, and in many cases so also may physical inequality. But mental inequality, according to the psychologists, seems to be pretty much a fixed condition. They, with their brother scientists in the realm of genetics, seem to have proved to the satisfaction of the majority of their fellows that an individual's mental capacities are determined from the moment of his conception, and that the limitations of his mental development are predetermined by the forces of heredity. This means for us, among other things, that as soon as a school child has reached his limitations, if not before, he will begin to fall behind his classmates who have inherited better mental equipment, and that no amount of extra coaching on our part nor of effort on his part will enable him to keep up for long unless the rest of the class is held down to his pace. If, therefore, efficiency means partly the elimination of wasted effort, should we not, in the name of efficiency, eliminate the waste of time and energy expended in the hopeless task of trying to fit all children to the same mold?

Only for the past few years—in fact, only since the publication of the Binet-Simon Intelligence Scale, in some of its later and better editions—have we possessed a really practical and fairly accurate tool for the measurement of intelligence, one which can be used effectively by interested persons of ordinary intelligence with little experience in psychological testing. This scale—because of the many years of careful investigation and experiment by its originator, the several painstaking revisions, and its careful standardization both as to content and method of procedure—is undoubtedly the most accurate intelligence test available. The fact, however, that each individual must be interviewed separately

makes it unsuitable for general use in testing large numbers of pupils, as, for example, in making an educational survey. For a few examiners to test thousands of children in a large school system, or for one examiner to test several hundred children in a small school system with the Binet-Simon Scale would take more time than is usually available for such purposes. This is especially true if the testing must be done by the superintendent or his assistants along with their numerous other duties.

When we entered the war against Germany our military authorities were faced with the problem of selecting and training thousands of new officers to lead the millions of raw recruits furnished by the draft. Time was at a premium. The psychologists offered their assistance, and after a period of trial it was decided to permit them to select the new officer material by giving intelligence tests to the more promising of the drafted and enlisted men. The above-mentioned limitation to the practical use of the Binet-Simon Scale was quickly realized and led to the hurried devising and standardizing of group intelligence tests by means of which hundreds of individuals could be tested at one time. These tests were to some extent based on the Binet-Simon Scale and to a greater extent on the special mental tests which had hitherto been used in psychological laboratories (directions, analogies, opposites, etc.). The new instruments, however, were adapted in organization and method of procedure to group presentation, definite response, and objective scoring. By the end of the war such tests had reached a high degree of development. The industrial and social world, awakening to the possibilities of mental measurement, soon adopted the army tests for their own purposes, as they could well do since they were dealing mainly with adults. But radical changes were required to fit them for use in testing the mental abilities of elementary-school children. Devising suitable group tests for the younger children who cannot read or write much was the most difficult problem. This problem has been partially solved within the last three years by means of picture completion tests. There are now available a number of excellent group tests adapted to school use.

In this district we have used the Otis Group Intelligence Test for the upper grades, the Dearborn test for the lower grades, and the Haggerty tests for all the grades. Although we have derived several worth-while advantages from their use, the original purpose in giving them was to discover all the mentally incompetent children in the schools of the district. The scheme for measuring the ability of teachers by the progress of their pupils, as described in a previous article (such progress to be measured by standardized achievement tests) demanded some way of finding out which pupils were mentally capable of making somewhere near normal progress and which ones were incapable of doing so. It is manifestly unfair to expect teachers to secure normal progress with feeble-minded or very dull pupils. Accordingly, the work of determining the mental ages and intelligence quotients of all the children in the district was undertaken soon after they had been graded in October.

At that time as far as I knew the most suitable standardized group intelligence test on the market was the Otis test. It contains excellent testing material organized and arranged so as to be easily and objectively scored. It is supposed to be used as low as the third grade, but on checking up the results with those from the Binet-Simon Test I found that, although the correlation was fairly high in the seventh and eighth grades, it grew rapidly less in going down the grades until in the third grade it was too small to bespeak much accuracy for the Otis test. This is assuming, of course, that the Binet-Simon Test is the standard in accuracy. Just as a guess, I might venture the opinion that the Otis test makes too great demands on concentration and acquired reading ability to give accurate results below the sixth grade except with the brightest children.

This failure of the Otis test to give accurate results in the lower grades was somewhat discouraging. I had planned to use it with all pupils above the second grade and then gradually, as I could find time, to test out the first two grades with the Binet-Simon Scale. It now appeared that I should have to begin with

the individual tests in the fifth grade and work down. In the interests of uniformity and accuracy I planned to do all the mental testing myself, and even with group tests this would be a considerable task in a district where the schools were so scattered.

Nevertheless I tackled the job and by the end of the Fall term had tested more than seventy pupils with the Binet-Simon Scale. During the first month of the winter term other matters kept me busy. Then came the giving of the midyear achievement tests and the attendant work of tabulating results. I had just got around to taking up the mental testing once more, when the Haggerty tests made their appearance. I ordered some to try out. They were first given, in the four lower grades to the same children to whom the individual tests had already been given. I was delighted to find a fairly close agreement between the Haggerty and Binet-Simon results even in the first and second grades. Then I began all over again, giving the Haggerty tests right through the district in all the grades. The giving of the tests took about a week and by the end of three weeks they were all corrected and the results recorded.

Each pupil's mental age and intelligence quotient were recorded on his or her graph card where they have often proved very enlightening when studied in connection with the pupil's achievement record on the same card. For instance, I have before me as I write, the card of a thirteen-year-old boy with an intelligence quotient of 108. Although his mental age at the time of the test was 13 years, 11 months, he was only in the sixth grade and his achievement record showed that even in that grade he was doing poor work. Now why should a child of his age and intelligence be doing poor work in the sixth grade? Any one or more of various conditions might account for it such as poor teaching, poor general health, adenoids, enlarged tonsils, defective sense organs, unfavorable living conditions at home, constant fatigue from outside work, and so on. But if we are to handle such cases with understanding and sympathy, we must know definitely the cause of the trouble.

In this boy's case it was found on investigation to be a combination of untoward circumstances. To begin with, he was much overworked outside of school hours, often at tasks beyond his strength. Moreover, his parents were constantly quarreling and snarling at each other, making home life a misery to the sensitive boy. A medical examination showed him to be in good general health but revealed the fact that he was a little deaf; a fact never before suspected even by his parents. In connection with this fact it is significant that his teacher was accustomed to speak in rather subdued tones, so that he lost a large part of the oral instruction. To sum up, the boy was hard of hearing, sensitive, tired, and discouraged.

Having discovered these conditions, we moved to remedy them as far as possible. Seating the boy where he could watch the teacher's lips at all times when she was talking to the class enabled him to get much instruction which under former conditions would have been lost to him. A tactful show of sympathy and understanding on the teacher's part and words of encouragement instead of constant nagging for failure to do the class work brought a new light to his eyes and the sullen look of a misunderstood boy left his face. His whole attitude toward the school and its work changed. A talk with his father, who did not mean to be either unreasonable or unkind, helped to lighten his burden of work at home. A talk with both parents concerning the effects of their constant bickering on their boy's life, served to make home life more pleasant. They were really a devoted couple and their quarreling seemed to be more from habit and more because they enjoyed it than because of real ill-feeling. This pupil is undoubtedly a much happier boy, interested in his school work, and gradually catching up with the other children of his age and ability in the school. He is no longer considered dull.

Such investigations and readjustments are decidedly worthwhile. But before they can take place our attention must be attracted to the need for investigation. And here the worth of standardized tests, intelligently used, is again demonstrated. In this boy's case it is interesting to conjecture how long it might

have been before the need for investigation would have become apparent, if the results of his mental and achievement tests had not been recorded on the same card and carefully studied together by someone interested in interpreting them for the best good of all concerned.

This was a particularly interesting case, and for this reason it was chosen to illustrate my point. But it is not the only case where comparison of mental test records with achievement test records has led to investigations resulting in permanent good. And there is need of investigation whenever a child grades high in mental ability and low in actual achievement of school work. For it is very unusual to find a pupil, physically and mentally normal, in good health, and with good home influences, who is doing unsatisfactory work in school. If such is apparently the case, there is generally something wrong somewhere; and it is usually possible to make a beneficial readjustment.

Another card represents a type of pupil constituting one of the serious school and social problems. It is the record of a boy of 15 years, 6 months. His mental age is 9 years, 2 months and his Intelligence Quotient, 59. This boy's graph shows that he cannot do satisfactory work in the third grade, although he has been in that grade for four years. Investigation revealed his immediate ancestry to be of unusually low mental and moral caliber. This boy is a menace to the school and the school is a menace to him. He is a menace to the school because, with all the dawning strength, instincts, passions, and emotions of the primitive male controlled only by the undeveloped mind of a nine-year-old, he is no fit associate for normal boys and girls. The school is a menace to him because, instead of furnishing him with interesting and valuable employment suited to his abilities, it is wasting time that he could more profitably and instructively employ elsewhere and because it is forcing upon him habits of idleness and failure. (Unless special classes are available, the public school is no place for children with intelligence quotients much below 70 especially when they have become two or more years retarded in their school work.) No further evidence is needed that they have reached the

limit of their mental development along the lines of the ordinary program of studies. They should be transferred to special institutions whenever possible where they can have special training suited to their needs and capacities, and measures should be taken to prevent them from reproducing their kind. At any rate, the public schools should be rid of them. With the proofs furnished by the results of intelligence tests, backed by the child's record of achievement in his school work, it ought to be possible to get school boards to act in excusing such children from school even if they cannot be otherwise properly taken care of.

Still more of a problem, from all points of view, are the children with intelligence quotients ranging from 65 to 80. More often than otherwise they appear superficially to be entirely normal or even bright. They may do excellent work in the first four grades where habit formation is the chief end to be attained and where drill is the chief feature of instruction. Sometimes they continue to do fairly well even in the upper grades in schools where much rote memorizing prevails and where memorizing ability is mistakenly considered an index of general intelligence and learning power. But in properly conducted schools such children begin to fall behind their classmates in the fifth and sixth grades and soon become hopelessly retarded. They have reached the limits of their abilities in learning from books or from ordinary schoolroom instruction. They are very much lacking in the powers of initiation, discrimination, and reasoning demanded by the higher types of learning. They are incapable of higher thought processes. Hence they fail in grammar, problem-solving in mathematics, and in the content subjects if the teaching of the latter demands, as it should, more than mere memorization of facts.

Teachers are often unjustly blamed because such children fail in their work. Parents wonder why their children cannot learn under the new teacher as well as they did under the old when it is in no way the fault of the teacher. The children have simply reached their limit of mental development. If a child reaches the limit of his mental development at a mental age of eleven years

he will never be much older than eleven years mentally, though he lives to be a hundred. Children of this sort are too often permitted to become the pacemakers in their classes to the untold harm of the brighter pupils. But in spite of all attempts to keep them along with the other and brighter children of the same age, they finally get completely beyond their depth and fail day after day in their school tasks until they begin to believe they are absolute failures and that success in anything is impossible for them. They grow discouraged, give up trying, and devote themselves to mischief or wait passively for the legal age limit to be reached so that they can leave school and go to work at something where they can at least earn a little money in return for their time. Meanwhile, failure and idleness have all too often become habits that follow them beyond the schoolroom and lessen their social efficiency. In such cases the school has defeated its own ends.

This type of child, the high-grade moron, is such a problem partly because he is not generally recognized as being mentally deficient. The shortcomings of the feeble-minded are generally evident, and no one expects much from them. The high-grade moron, however, is usually normal in appearance and in ordinary intercourse with other people appears to be normal mentally. It is only when situations arise which demand the functioning of the higher forms of intelligence that he reveals his deficiencies. Even his teacher often fails to understand why he continually fails in his school work. He is characterized as "obstinate" and "lazy" when in reality he is mentally deficient and incapable of doing the work demanded of him. Carefully conducted mental tests will reveal such cases and should lead to more sympathetic and intelligent treatment of them.

When such children become retarded as much as two years, it is little less than criminal to keep them in rural or small-town schools where there are no special classes for their benefit and where there is not sufficient differentiation of courses to permit of their being given amounts and kinds of work suited to their abilities. If possible they should be sent to manual trades schools where they can be taught a trade and at the same time be given

as much cultural training as they are capable of acquiring. Otherwise some arrangements should be made whereby they can leave school and go to work under the supervision of their parents or of other responsible persons who will instruct them in the rudiments of some useful line of work. They might still be under the supervision of the school authorities to the extent of being obliged to spend as many hours per week in useful labor under real instruction as they would normally have to spend in school; such supervision of the school authorities to continue until the legal age limit for compulsory attendance is reached. And why could not school credits be allowed for such work?

To return, however, to my main purpose in giving the intelligence tests. When I first discussed with the teachers of the district the feasibility of some scheme of rating teachers based principally on the progress made by their pupils, it was objected that the varying mental abilities of the children would make such rating unfair unless the records of the slower pupils were ignored. But who was to be the judge as to which pupils were incapable of making normal progress? It was this situation which led us to make use of the intelligence tests. We agreed to discard, in calculating the teachers' rating the records of all pupils with intelligence quotients below 80. Later a still better scheme was worked out based on the average intelligence quotients of the different schools in such a way as to take full cognizance of the varying mental abilities of pupils. Thus, a teacher with a school composed in general of dull children would not suffer in comparison with a teacher of equal ability with a school largely consisting of bright children. That is, two teachers of about equal ability would get approximately equal ratings regardless of the comparative average mentalities of their respective schools. In this scheme the intelligence test was the impartial judge whose findings were accepted as satisfactory by both teachers and superintendent.

Another valuable service of the intelligence tests was in locating the children of very superior abilities. In one school of 25 pupils I discovered five with intelligence quotients around 140

and none with intelligence quotients of less than 80. This school was locally noted as being uniformly fortunate in securing good teachers under whom the pupils advanced very well indeed. Of course it would be a mighty poor teacher that couldn't get passable results with such a school. In another school I found, working with other children of about the same chronological age, a little girl of 8 years, 6 months with a mental age of twelve years and an intelligence quotient of 142. In the ordinary run of events she would probably have secured no further recognition of her superior abilities than regular promotion and graduation in due time. She is now 9 years, 5 months old and leading her class in the fifth grade. She could probably do satisfactory work in the sixth grade.

This type of pupil is not generally recognized as a serious problem. And in truth, the situation is more serious to the pupil and the public than to the teacher, however unconscious of the fact they may be. As at present organized, the average school is probably doing such children as much harm as it is good, in that it does not furnish them with opportunity and incentive to develop their capacities to the limit. It is from among these children that the leaders of the future are to come, and the public which foots the bills is being cheated when such children are not given opportunity to develop as they should. The present generation is retarded in progress by the provincial narrowness of natively intelligent but mentally blind leaders of the blind whose possibilities for development were early cramped to deformity in the narrow confines of the traditional elementary- and secondary-school programs by being forced to travel in a groove in competition with their mentally inferior classmates. Our school system can never attain nearly its maximum efficiency until programs and courses of study are so differentiated as to fit the kind and quantity of work to the mental capacities of individual pupils. The standardized intelligence test will prove a useful tool in shaping plans toward that end.

The problems noted above are present to a greater or less extent in practically all school systems; but it is in the cities



of book work and a maximum of manual training. The pupils in the normal group would perhaps divide their time somewhat evenly between these two lines of work. The superior group could probably accomplish as much of the manual work as the normal group and much more of the mental work.

In this way intelligence tests may assist in bringing about that much needed differentiation in courses of study which will permit each pupil to have work more suited to his particular abilities. Although it is advisable, where possible, to have a double grouping based on the results of intelligence tests—namely, one grouping according to mental ages for classification by grades and the other grouping based on intelligence quotients for subdivisions of grades—such a double grouping is not usually possible in the smaller schools where all the pupils in a grade must work together. In these cases the grouping must depend more on the mental ages, as will be explained further on.

It was while engaged in recording the mental ages and intelligence quotients of the pupils on their respective graph cards that the possible use of intelligence tests for grading purposes occurred to me. I gradually became conscious of the fact that, although there was wide variation in the chronological ages of the children in any one grade (as they had already been graded by the standardized achievement tests), the mental ages in a grade did not usually appear to vary by more than a few months, or a year from the average mental age for the grade. If, therefore, as may apparently be expected, there is close correlation between the results of intelligence tests and the combined results of achievement tests, that is, between mental ability and accomplishment of school tasks, why cannot intelligence tests be used instead of achievement tests for grading purposes, at a considerable saving of time and energy?

When, therefore, I had finished recording the results of the intelligence tests on the graph card, I proceeded to develop this idea. The chronological and mental ages of all the sixth-grade pupils in the Tamworth schools were tabulated as shown in Table I.



we go down the grades, would seem to support the reasonable and suspected fact that all tests are less accurate and dependable the younger the children tested. The overlapping encountered in the two lower grades led me to make still another tabulation—namely, of the seventh grade—so that I could compare it for overlapping of mental ages with the sixth grade. There was an overlap of about 14 percent between these two grades. This would indicate that the amount of overlapping also increases from higher to lower grades and probably for the same reason mentioned above for the increase in range of mental ages.

Then I began to wonder how much differently the pupils would have been grouped by grades if the grading had been done with intelligence tests instead of achievement tests. So I constructed a distribution as shown in Table II. Having no established data as to what the limits of the range should be for the different grades, considerable experimenting was necessary with different arrangements of intervals. A two-year range was finally adopted since I had already found, as described above, that the range of mental ages for each grade was about two years. Since children ordinarily enter school between ages six and eight, and since the chronological age of a normal child corresponds with his mental age, the first grade was assigned the range of mental ages from 6-0 to 7-11. (The expression 7-11 means 7 years, 11 months and so for like expressions). The interval used in Table II is one year, but two intervals are allowed for each grade in order to show a more exact distribution. This arrangement also allows for an overlapping between grades of one year of mental age. Thus the normal range for the first grade pupils is from 6-0 to 7-11, that for the second grade from 7-0 to 8-11, that for the third grade from 8-0 to 9-11, and so on. Moreover, the children in any annual age group may be normally in either of two grades. For instance, the nine-year-olds are normally placed in either the third or fourth grade. The first grade might be regarded as having a range of three years because all children with mental ages below 6-0 will naturally be included in that grade. A somewhat similar statement may be



working below. This shows on the whole a pretty close agreement between the results of intelligence tests and achievement tests and indicates that either gives much the same basis for grading.

I have studied the records of the children whose mental ages show them to be misplaced and find that most of those working above normal grade are pupils that had been pushed too far ahead by their teachers before the preliminary grading took place and whom, since they were working hard to hold their places, we did not demote when regrading. About half of the pupils shown as working below their apparent mental capacities are accounted for by retardation due to sickness or absence, poor general health, sensory defects, etc. Most of the others remain a mystery as yet. Gradually we hope to work out most of the misplaced ones into their proper mental-age groups so that the grouping of pupils throughout the district will be based pretty closely on mental age.

City schools can be graded with intelligence tests into eight mental-age groups as shown in Table II and then, since there will be a wide variation of intelligence quotients within each mental-age group, these groups can be subdivided into grade divisions or sections as explained above. But the smaller rural schools without grade subdivisions must necessarily be satisfied with a less perfect distribution. Let us suppose that we have given the intelligence tests in a rural school and that the mental ages and intelligence quotients of the pupils are found to be as shown in Table III. Now, let us select all the mental ages within the first-grade range (all below 8-0); and let us list them separately in Table IV with their intelligence quotients.

In discussing Table II it was noted that part of the children in the 7-0 to 7-11 age group would normally be in the second grade. How shall we decide which ones belong in the second grade? To begin with, no child just beginning school will belong there. Accordingly, in Table IV let us mark with a star the number of each pupil who attended school the previous year.



TABLE V.—PUPILS WITH MENTAL AGES BETWEEN 8 AND 9

PUPIL NUMBER	MENTAL AGE	INTELLIGENCE QUOTIENT
6*	8-4	91
17	8-5	71
22	8-6	82
36*	8-0	92
39*	8-6	100
43	8-7	73

TABLE VI.—PUPILS WITH MENTAL AGES BETWEEN 9 AND 10

PUPIL NUMBER	MENTAL AGE	INTELLIGENCE QUOTIENT
13*	9-2	96
16*	9-7	101
26	9-4	73
28	9-8	80
31	9-10	78
32*	9-0	93
35*	9-0	95
40	9-1	85

TABLE VII.—PUPILS WITH MENTAL AGES BETWEEN 10 AND 11

PUPIL NUMBER	MENTAL AGE	INTELLIGENCE QUOTIENT
8*	10-8	100
12*	10-9	132
18*	10-0	90
20	10-6	70
37	10-6	85
38	10-1	73

All the others will therefore go to make up the first grade.

Next let us consider the mental age group from 8-0 to 8-11 listed in Table V. Part of these belong in the third grade and part in the second. We will choose those with intelligence quotients of 90 or better for the third grade and mark their numbers with a star. The second grade will then consist of pupils 17, 22, and 43 from Table V and pupils 3 and 19 from Table IV.

made for the eighth grade, since it might be expected to include any mental age above 13-0. This bunching of mental ages is, of course, due to the fact that these grades are the lowest and highest respectively in the school.

TABLE II.—MENTAL AGES OF PUPILS IN EACH GRADE

MENTAL AGES	GRADES								TOTAL
	I	II	III	IV	V	VI	VII	VIII	
5 to 5-11	8								8
6 to 6-11	39	4							43
7 to 7-11	45	43	4	1					93
8 to 8-11	2	46	28	5					81
9 to 9-11		5	41	26	4	1			77
10 to 10-11			3	19	27	6	1		56
11 to 11-11			2	4	36	23	5		70
12 to 12-11				1	4	47	18	3	73
13 to 13-11					2	3	28	3	36
14 and over						6	15	34	55
Total	94	98	78	56	73	86	67	40	592

Table II shows the distribution of pupils as they are actually graded in this district on the basis of achievement in standardized tests. Five hundred and ninety-two children are represented. All figures between the heavy zigzag lines represent children normally placed according to their mental ages. The figures outside these lines represent pupils working, for some reason, in higher or lower grades than the tests show them to be fitted for. Take the third-grade column for instance. In this grade there are 28 children between 8-0 and 8-11 and 41 between 9-0 and 9-11 that rightly belong there. There are four children in the grade that, according to their mental ages, ought to be in the second grade, and on the same basis still other children belong in the fourth and fifth grades.

Now, if all the schools were graded strictly on the basis of the mental ages of pupils, *all* the figures would fall between the zigzag lines. Hence 89 out of 592 or 15 percent of the pupils are working above or below their mental capacities. Of these, 7.1 percent are working above or trying to, and 7.9 percent are

working below. This shows on the whole a pretty close agreement between the results of intelligence tests and achievement tests and indicates that either gives much the same basis for grading.

I have studied the records of the children whose mental ages show them to be misplaced and find that most of those working above normal grade are pupils that had been pushed too far ahead by their teachers before the preliminary grading took place and whom, since they were working hard to hold their places, we did not demote when regrading. About half of the pupils shown as working below their apparent mental capacities are accounted for by retardation due to sickness or absence, poor general health, sensory defects, etc. Most of the others remain a mystery as yet. Gradually we hope to work out most of the misplaced ones into their proper mental-age groups so that the grouping of pupils throughout the district will be based pretty closely on mental age.

City schools can be graded with intelligence tests into eight mental-age groups as shown in Table II and then, since there will be a wide variation of intelligence quotients within each mental-age group, these groups can be subdivided into grade divisions or sections as explained above. But the smaller rural schools without grade subdivisions must necessarily be satisfied with a less perfect distribution. Let us suppose that we have given the intelligence tests in a rural school and that the mental ages and intelligence quotients of the pupils are found to be as shown in Table III. Now, let us select all the mental ages within the first-grade range (all below 8-0); and let us list them separately in Table IV with their intelligence quotients.

In discussing Table II it was noted that part of the children in the 7-0 to 7-11 age group would normally be in the second grade. How shall we decide which ones belong in the second grade? To begin with, no child just beginning school will belong there. Accordingly, in Table IV let us mark with a star the number of each pupil who attended school the previous year.

These pupils may enter the second grade if their mentality is normal or better. Let us therefore mark with an additional star those with intelligence quotients of 90 or above. Those thus marked with a double star may be assigned to the second grade.

TABLE III.—RESULTS OF MENTAL TESTS IN A SELECTED SCHOOL

PUPIL NUMBER	MENTAL AGE	INTELLIGENCE QUOTIENT	PUPIL NUMBER	MENTAL AGE	INTELLIGENCE QUOTIENT
1	5-0	76	23	7-0	80
2	7-1	76	24	13-0	106
3	7-11	103	25	14-7	110
4	7-9	79	26	9-4	73
5	6-11	100	27	7-9	83
6	8-4	91	28	9-8	80
7	15-7	128	29	7-8	68
8	10-8	100	30	14-0	110
9	15-0	123	31	9-10	78
10	11-10	84	32	9-0	93
11	13-7	108	33	11-0	108
12	10-9	132	34	12-4	80
13	9-2	96	35	9-0	95
14	11-1	100	36	8-0	92
15	13-9	138	37	10-6	85
16	9-7	101	38	10-1	73
17	8-5	71	39	8-6	100
18	10-0	90	40	9-1	85
19	7-9	95	41	12-0	83
20	10-6	70	42	13-9	102
21	13-5	108	43	8-7	73
22	8-6	82			

TABLE IV.—PUPILS WITH MENTAL AGES BELOW 8 YEARS

PUPIL NUMBER	MENTAL AGE	INTELLIGENCE QUOTIENT
1	5-0	76
2	7-1	76
3**	7-11	103
4*	7-9	79
5	6-11	100
19**	7-9	95
23	7-0	80
27*	7-9	83
29*	7-8	68

TABLE V.—PUPILS WITH MENTAL AGES BETWEEN 8 AND 9

PUPIL NUMBER	MENTAL AGE	INTELLI- GENCE QUOTIENT
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22	8-6	82
36*	8-0	92
39*	8-6	100
43	8-7	73

TABLE VI.—PUPILS WITH MENTAL AGES BETWEEN 9 AND 10

PUPIL NUMBER	MENTAL AGE	INTELLI- GENCE QUOTIENT
13*	9-2	96
16*	9-7	101
26	9-4	73
28	9-8	80
31	9-10	78
32*	9-0	93
35*	9-0	95
40	9-1	85

TABLE VII.—PUPILS WITH MENTAL AGES BETWEEN 10 AND 11

PUPIL NUMBER	MENTAL AGE	INTELLI- GENCE QUOTIENT
8*	10-8	100
12*	10-9	132
18*	10-0	90
20	10-6	70
37	10-6	85
38	10-1	73

All the others will therefore go to make up the first grade.

Next let us consider the mental age group from 8-0 to 8-11 listed in Table V. Part of these belong in the third grade and part in the second. We will choose those with intelligence quotients of 90 or better for the third grade and mark their numbers with a star. The second grade will then consist of pupils 17, 22, and 43 from Table V and pupils 3 and 19 from Table IV.

Table VI lists the pupils of the mental age group from 9-0 to 9-11. Those with starred numbers (intelligence quotients of 90 or above) will be placed in the fourth grade while the rest, together with those having starred numbers in Table V will make up the third grade.

Table VII lists the pupils of the age group from 10-0 to 10-11. From this table pupils 8, 12, and 18 will be placed in grade V while pupils 20, 37, and 38 will go with pupils 13, 16, 32, and 35 from Table VI to make up the fourth grade. There may be some question as to the advisability of placing pupil No. 18 in the fifth grade since his intelligence quotient is barely 90. On the other hand, if pupil No. 12 has had good instruction and is ambitious and industrious he may be able to work in grade VI since his intelligence quotient of 132 shows him to be a pupil of very superior ability. The remaining children listed in Table III may be assigned to their grades in like manner, whereupon the preliminary grading of the school is completed. Some readjusting will probably be found necessary for various reasons which the results of intelligence tests do not allow for. But when once adjusted there should be possible a uniformity of achievement within grades that is absolutely impossible in the school as ordinarily graded where pupils differing in mental age by as much as five or six years are often found working together, or trying to work together, in the same grade.

As I have said before, when I first attempted to grade pupils there were available no standardized group intelligence tests that would cover all the grades. I therefore used achievement tests for grading purposes, as explained in my third article. Although that grading has proved satisfactory, and although Table II plainly shows it agrees closely with the grading that would have been made if intelligence tests had been used, nevertheless, if I had any more preliminary grading to do, I should do it with the group intelligence tests supplemented by the Binet-Simon individual test wherever there was any doubt of the accuracy of the results of the group tests.

## THE VALIDITY OF THE WHIPPLE GROUP TEST IN THE FOURTH AND FIFTH GRADES

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Among the special classes in operation in the schools of Jackson are what are known as "speed" classes, wherein pupils accomplish two semesters' work in one semester. Candidates for these classes are selected in part by means of group intelligence tests. In the spring of 1921 it was felt desirable to supplement the National Intelligence Test, Scale A, with some other group test in order to make a more accurate selection of pupils for the speed classes of the following autumn. The Whipple Group Tests for Grammar Grades were originally designed for the specific purpose of selecting gifted pupils—a purpose which was also ours. The Group Tests for Grammar Grades, however, had primary reference to grades above the fifth. Their applicability in the fourth and fifth grades was experimentally investigated with results which will be reported in this paper.

### PRELIMINARY TRIAL

In order to see whether the tests would operate smoothly and whether the scores obtained would accord approximately with estimated intelligence, a preliminary trial was made with 55 pupils in two rooms that had previously been tested with the National Intelligence Test and in which the pupils were known to be on the whole of about average ability. The pupils belonged to the IV-B, IV-A, and V-B grades.<sup>1</sup>

*Changes in instructions.*—In this preliminary trial it was found necessary to alter the instructions somewhat, especially in the lower half of the fourth grade. In substance, these alterations were as follows:

*Tests 1 and 2.* No changes.

*Test 3.* Because some pupils were unfamiliar with the terms 'plus' and 'minus' the directions were changed to: "If the sentence is true, put a little cross in front of it (illustrating on the blackboard); if the

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<sup>1</sup>At Jackson "B" indicates the lower half and "A" the upper half of each yearly grade.

sentence is not true, put a dash, or a little straight line in front of it (also illustrated)." The test was not begun until it was certain that all the pupils had marked correctly the four sample sentences. Finally, there was added to the directions a warning not to ask questions and to skip a sentence that could not be understood—this because some of the pupils could not recognize in print words, like "kindergarten," that they knew orally, and because others interrupted the testing to ask such questions as: "How far is it from New York to Chicago?" (No. 10) or "How many pounds are there in a ton?" (No. 17).

*Test 4.* A warning was added not to ask questions.

*Test 5.* The instructions were amplified, especially in the fourth grade, substantially as follows: "Let us suppose that the square at A is a sheet of paper. Then it is folded like this (illustrated with an actual sheet of paper), so that it looks like B. After that, a hole is punched clear through it, as at C. When the paper is unfolded, it will have a crease in it where the dotted line is at D. How many holes will there be in it? Draw little circles to show where they will be (illustrated by drawing such circles on the blackboard in a figure like D)." After concluding the directions as given in the test blank, there was added the final caution: "Remember to read the directions and do exactly what it says to do."

*Test 6.* The instructions were considerably amplified, substantially as follows: "Two sentences may use different words, but *mean* the same thing. Look at the first sentence under English Proverbs (pointing to heading on the blank). It says: 'Don't shout until you are out of the woods.' Now look at the column of Arabian Proverbs. The second one says: 'Don't throw away your stick until you get to the top of the hill.' That *means* the same thing as the English proverb we just read. It has a number 2 in front of it, so there is a number 2 in front of the English proverb to show that it has the same meaning. Now look at the second English sentence, or proverb: 'A poor cask will hold good wine.' Think what it means; then go to the Arabian Proverbs and hunt for one that means the same thing. When you have found it, see what number is in front of it, and write that number in front of the English proverb. Go ahead and do it." When certain that all the pupils had done this correctly, we continued: "Now find what number should be written in front of the last proverb, and write it there." When all the pupils had done this, the instructions for work on the test itself were added thus: "On the next page are more proverbs, one set of English and one set of African proverbs. You are to 'match up' the proverbs that mean the same thing. Look at the first proverb in the first column. Think what it means, and then hunt in the second column for one that means the same thing. When you have found it, write its number in front of the one in the first column, just as you did on this page. Be sure to find the right number for each proverb."

Individual help may still be needed for some low-fourth grade pupils, after the others have begun the work.

*Results.*—The tests, when administered with these alterations in the instructions, yielded satisfactory distributions and accorded well with the teachers' estimates of general intelligence. Without pausing to show the entire distributions, the general drift of the scores may be shown as follows:

GRADE	MINIMUM	MEDIAN	MAXIMUM
IV-B	20	48	72
IV-A	24	52	96
V-B	40	56	104

#### TESTING THE SELECTED PUPILS

Each teacher of grades IV and V throughout the city was directed to select the best five pupils in her grade, and to send them, on a given day, to a central building for examination.

The results of the examination of the 142 pupils thus selected by the teachers are indicated in Table I.

TABLE I.—DISTRIBUTION OF SCORES IN THE WHIPPLE GROUP TEST FOR GRAMMAR GRADES

SCORE	GRADE IV-B	GRADE IV-A	GRADE V-B	GRADE V-A
40-44.....	3	0	0	0
45-49.....	3	0	1	0
50-54.....	5	2	1	0
55-59.....	2	7	0	0
60-64.....	4	4	0	0
65-69.....	1 (Med.)	3	1	0
70-74.....	2	3	3	2
75-79.....	2	6 (Med.)	5	2
80-84.....	3	5	2	5
85-89.....	3	5	2 (Med.)	4
90-94.....	0	4	6	7 (Med.)
95-99.....	1	5	1	3
100-104.....	0	0	2	4
105-109.....	0	0	3	3
110-114.....	0	0	0	4
115-119.....	0	0	0	5
120-124.....	0	0	1	0
125-129.....	0	0	2	0
Total.....	29	44	30	39

### SELECTING FOR THE "SPEED" CLASSES ON THE BASIS OF THE TEST SCORES

From the 142 pupils here tested and from the unselected group of 55 tested in the preliminary trial of the Whipple tests, about 60 were to be chosen for the speed rooms.

For admission to the speed rooms, three factors were considered: (1) chronological age; (2) the judgment of the teachers, already at hand in the list of names of the best five pupils in each room, arranged in order of rank in their class; and (3) the reaching or surpassing of a certain critical score in the intelligence test.

For the determination of the critical scores in the Whipple test, data from other cities showed that for unselected sixth-grade pupils the 50-percentile is 81, and that for unselected seventh-grade pupils the 40-percentile is 94 and the 50-percentile is 101. On this basis, the following standards were set as criteria (combining factors 1 and 3 above) for admission to the speed rooms from the fourth and fifth grades:

Grade IV: a score not less than 80 and a chronological age not over 11 years.

Grade V: a score not less than 93 and a chronological age not over 12 years.

The effect of these standards is to select from the fourth grade, pupils at least equal to the average sixth-grade pupil, and to select from the fifth grade, pupils who were practically (fortieth percentile) equal to the average seventh-grade pupil.

The pupils who met these standards began work in the speed classes in September, 1921, and at the present writing (November) their work has proved unusually satisfactory. Watch is being kept of their progress and an attempt will be made to study the cases in which progress in the speed room does not seem to justify the selection.

### CORRELATIONS BETWEEN TESTS AND BETWEEN TESTS AND SCHOLARSHIP

Scores on the National Intelligence Tests, Scale A, Form I, were available for 174 of the pupils who took the Whipple Group Tests for Grammar Grades. The correlation between these two test scores was 0.74.

Correlations were also computed between each of the general intelligence tests and the scholarship records of the pupils in the unselected group (the pupils used in the preliminary trial). To make these correlations possible, it was necessary to translate the school marks from letter ratings to numerical equivalents and to express the intelligence scores of the two school grades on a common basis. For the first purpose we took the pupils' standings for the preceding semester in reading, spelling, arithmetic, language, geography, and history and gave a credit of four points for each A, three points for each B, two points for each C, and one point for each D. The total of these points was taken as the scholarship standing. For the second purpose, the intelligence test scores for each group were distributed in such a way that the percentile equivalent for any score could be ascertained. The scores obtained by IV-B pupils were then raised to an equivalent IV-A score, and those obtained by V-B pupils were reduced to an equivalent IV-A score. Thus, for example, in the Whipple Group Test a IV-B pupil who scored 54 was found to rank at the 70th percentile for that grade; he was then, for the purposes of the correlation, considered as having scored 61, which was the score at the 70th percentile for the IV-A grade.

The results show a correlation of 0.64 between scholarship and the National Intelligence Test scores (49 cases) and a correlation of 0.68 between scholarship and the Whipple Group Tests scores (54 cases).

### CONCLUSION

The Whipple Group Test for Grammar Grades, originally designed for selecting gifted pupils in the upper grammar grades, can be successfully employed for the same purpose in the fourth

and fifth grades, provided some amplifications are made in the instructions for three of the tests. The results obtained from these tests, when thus modified, show a very high correspondence with teachers' estimates of intelligence, with scores for the National Intelligence Test, and with scholarship records, while the pupils who are selected by them appear to form a very satisfactory group in such speed classes as we are operating at Jackson.

## Editorials

### REGULATING THE PROJECT

The history of American education is a chronicle of fads which have been hailed by the thoughtless as panaceas for all educational ills and have, in a short time, disappeared. But no fad of major rank has failed to have some contribution behind it. The object lesson which swept the country in the Golden Age of Oswego has left the language lesson as its contribution. The Herbartians, whose Five Formal Steps were hailed as the form of all instruction, trained the American teacher in the art of lesson preparation. The rational method, with its disciplinary extravaganza of moral suasion and its instructional principle of explanation before drill, was the matrix out of which has developed the so-called rational methods now in use. Interest is convalescing from its emotional measles and is getting ready to take its place through definition and limitation among the staple concepts of educational theory.

The latest idea to seize the center of the stage is the project method. At present it is the shibboleth of the progressive. The term is being warped from its original meaning as it passes from school to school across the land and there is no common definition by which to describe its varying forms as it appears in practice. Whole subjects are said to be taught upon the project basis and some schools have developed their curriculum entirely around what they call projects.

Though this can be expected to go on for some time yet, we know that some very important contributions will be left after "the hurly burly's done." Every extreme has its day and after that comes the roughhouse of the initiation ceremonies, when it is being shown its place before entering upon its long career of stable usefulness in chastened spirit born of criticism caused by failure to make good on all its claims.

It is highly desirable that this period of initiation be shortened, and this can be done by judicious planning. The many friends and well wishers of the method should recognize its limitations and so speak, write, and practice, that the stage of stability may be reached as soon as possible. Specifically, they should decide upon the fundamentals which the schools are supposed to teach to children; for there is some body of fundamental experience which can be accepted upon either traditional or objective grounds. Projects may come and projects may go, but this body of experience must be taught. It is the part of valor and of wisdom for the project curriculum maker to see that he does not merely teach projects but that he assures himself before meshing them into a going production unit that they are varied enough in form and content to give the fundamental experiences, which must be taught, the right proportion of emphasis and instruction. He should even be willing to engage a "mopping up" battalion or two to consolidate the instructional ground gained by his shock battalions. Without the necessity for apology, the project can be accompanied by a systematic study of subjects, by drills, and by exercises. The project is a wonderful agency for gaining ground. But it is too emotional and too tense to have the patience to consolidate experience through drill and skill and refinement of method.

Teachers can render significant service to the project method by taking a critical and sympathetic attitude toward it, with the full expectation that it will have a permanent contribution, but with the determination to see that its period of exuberant extravagance is shortened by an enlightened recognition of its contribution and its limitations.

W. W. C.

#### THE BUILDING PRINCIPAL

Superintendent Nelson's story at the N. E. A. meeting in 1909 has often been repeated. An enthusiastic young teacher returning home for the holidays describes her work to an interested audience. Pupils, patrons, and fellow teachers—even the janitor—pass in review. Finally some one asks the young lady

about her principal. "Oh, the principal," says she, "why, do you know, I hadn't thought of him because in my experience I have come to think of the principal as the man who hands out the chalk." Here and there in the scanty literature bearing upon the status, duties, and responsibilities of the principal bobs up Superintendent Nelson's chalk story.

Yet logically and historically the building principal occupies a commanding position—logically because the building is the natural supervisory unit, and historically because he is "the single time-honored official found in the modern school system." He appeared upon the scene long ago, and compared to him the superintendent is a belated arrival. His power is not as extensive as that of the superintendent, but it is more direct; it is not as intensive as that of the teacher, but it is more influential.

If, however, the principal's position is commanding, it is also so beset with hindrances that its importance in recent years is often potential rather than actual. It is "perhaps the weakest place in our city organization and administration." Yet most of its unrealized possibilities are the result of the system—of that highly organized hierarchy which characterizes most large city systems. It is not necessary, far less is it desirable, that the advent of the superintendent with his assistant and district superintendents and his staff of functional experts should rob the principal of his original jurisdiction or impose petty requirements upon him. Nevertheless such has been the case.

At New York, where the hierarchy to which we have referred is especially in evidence, the by-laws of the Board of Education name—or did name at the time of the survey in 1912—twenty-four distinct duties of the principal. Most of these duties have to do with reporting something. They include the preparation of requisitions, the keeping of inventories, the care of school property, the supervision of janitors, the conduct of fire drills, the preparation of payrolls, and attention to the absence and lateness of teachers. A list of these tasks gives one the impression that the fundamental duty of the principal is to make as many different kinds of reports as the central office can devise.

Nothing, however, inheres in his position which precludes the exercise of a predominant influence in the direction of better training for children. Observe, if you will, an organization chart such as that which Cubberley presents for a city employing 350 to 400 teachers. Note how the lines converge toward and diverge from the school principal. The city superintendent and his assistant superintendents operate through him. The superintendent of properties, the business manager, the attendance department, the school efficiency man, the health director, and the city librarian bring their influence to bear upon teachers and pupils largely through him. His authority is exerted not only upon the teachers, both regular and special, but also upon janitors and school nurses. It is he who, more than any other official, comes into direct contact with parents. Visitors, whether they belong to the system or not—even the superintendent himself—defer to the authority of the principal while in his building. He is “the responsible administrative head of his school.” He is the liaison officer upon whom the impact of official and public requirements is made and from whom impulses emanate which actuate teachers and pupils.

Only in a few quarters is this ideal recognized in practice. Lip service may be done it but true homage is not paid. No effective restraint upon the tendency to multiply the clerical and administrative duties of the principal, and no consistent policy of securing principals whose training will permit them to measure up to the possibilities of their position are generally observable. For the system has produced in too many instances the type of principal which it has encouraged. Official displeasure is far more likely to be expressed because of a faulty report than because of failure to lead or to inspire. Thus the principal becomes a reporting officer. Since economy must be exercised, and since he will be praised for it, he distributes penholders and pencils with penurious care. He develops a system for doing this on the basis of the least good to the greatest number. With a concentrated prudence born of long experience, he doles out the supplies for which he is held so rigidly accountable. We know of one prin-

cipal—and a very successful one, too, as success is usually counted—who reduces all his supplies to the common unit of the value of one white 6 by 9 pad. A certain number of pads are allotted to each teacher per semester. She can take the pads either as such or in their equivalent of note books, rulers, or raffia. If by rigidly denying material to the children she accumulates credit in terms of pads, she might perhaps obtain a dozen scissors, or a set of paint boxes.

There is no real reason why the principal should perform such service. He should be relieved of it, not only for the sake of releasing his time for supervision (which is his proper service), but also because as a clerk he is a highly paid failure. Moreover, there should be an ideal in the minds of superintendents and board members in virtue of which principals trained for educational leadership should be selected. In particular, the principalship should not be merely the safe berth of a superannuated teacher. The principal's office is one that requires enthusiasm, qualities of leadership, plasticity, training and study. Exceptions occur; but it is doubtful if persons who for the most part have passed beyond the age of forty at the time when they begin their careers as principals are likely to render the type of service which an exalted conception of the principalship would require, and which under any circumstances the teachers and pupils should receive.

Thus is the time-honored and potentially powerful office of the building principal abased. Boards of education and superintendents could perform few more constructive acts of administration than to restore the principalship to its pristine dignity.

B. R. B.

## Reviews and Abstracts

HAGGERTY, M. E. and others. *Virginia public schools; Part II, educational tests.* Yonkers-on-Hudson: World Book Company, 1921. xii + 235 pp.

Part II of the Virginia survey report deals with tests, educational and mental. It was prepared under the general direction of Dr. M. E. Haggerty of the University of Minnesota who is directly responsible for the chapters dealing with tests in arithmetic and general intelligence as well as certain general chapters concerning the work of the Division of Tests. Other chapters were prepared as follows: reading by Mrs. Cecile White Flemming of the Wisconsin State Department of Education, primary reading by Dr. M. E. Noonan of Harris Teachers' College, handwriting and spelling by Dr. F. S. Breed of the University of Chicago, high-school composition by Mr. Earl Hudelson of West Virginia University, and elementary algebra by Dr. H. G. Hotz of the College of William and Mary.

The Thorndike Reading Scale, Alpha 2, and the Haggerty Test, Sigma 1, were used in measuring ability in reading; tests in spelling were made up of words selected from the Ayres Scale; the Starch Scale was used in measuring handwriting; the Woody Scales and Exercise II of the Haggerty Intelligence Examination, Delta 2, were used in arithmetic, the former for fundamentals and the latter for reasoning; intelligence was measured by the Haggerty Tests, Delta 1 and Delta 2, and the Haggerty reading test, Sigma 1; the Nassau County Supplement to the Hillegas Scale was used in evaluating specimens in English composition; and Hotz's First Year Algebra Scales, Series A, Addition and Subtraction, Equation and Formula, were used in measuring the ability of first year high-school pupils in algebra. Although the list of tests used, as given in chapter I (p. 2), enumerates the Curtis tests, Series B, for arithmetic, and Exercise I of the Haggerty Intelligence Examination, Delta 2, for reading, no mention of the results secured through the use of these tests is made in the chapters dealing with those subjects.

In general, Virginia children fail to reach satisfactory standards. Although the best city white schools do as well as typical American city schools in reading and spelling, they fall behind in other subjects; while other city white schools, rural white schools, and city and rural colored schools lag far behind acceptable standards—in some cases as much as four years.

The book is a strong condemnation of the one-teacher school. "Almost one half of the white children (44 per cent) of Virginia receive their education in one-teacher and two-teacher schools. Such schools are the only educational provision for two-thirds of the colored children of the state. The product of schools of this type is, therefore, of tremendous significance in the educational life of Virginia, and because this product is of such a deficient character, the

small rural school constitutes one of the most serious educational problems, not only in Virginia, but throughout the South." (p. 194)

Recommendations are summarized as follows: "Chief among the necessary changes are: (a) the passage of an effective compulsory education law; (b) the lengthening of the school term to a one-hundred-eighty-day minimum; (c) improvement in the qualifications of teachers; (d) the increase of supervision, particularly of the rural schools; (e) a reduction of the one-room schools wherever possible in favor of consolidation; (f) the restriction of one-room schools to five grades; (g) improvement in the classification of children; (h) the organization of special classes for backward and superior children; (i) the employment of standard educational tests in measuring the progress of children and the efficiency of instruction; (j) the creation in the State Department of a bureau of educational investigation; (k) the creation of similar bureaus in all city and non-city divisions where conditions permit." (p. 13)

Particularly commendable is the plan for training public school officials and college and normal school teachers and students through participation in survey methods. According to this plan "About two hundred and fifty prospective teachers, fifty teachers now in service, and twenty-one professors in normal schools and colleges engaged from one week to two months each in the giving and scoring of tests. These remain in the school system to utilize and carry forward the work begun by the survey staff." (p. 6)

Naturally, a book written by a number of individuals will, unless very carefully edited, lack coherence and a definite plan for stating results. For example, the factor of over-ageness is very carefully considered in interpreting the results of reading tests in chapter III but is not mentioned in the arithmetic chapter and is merely alluded to, in making a comparison of race scores, in handwriting (p. 79). Again the chapter on arithmetic does not adapt standard scores to Virginia's seven-grade system as does the chapter on reading. And again graphic methods are considered necessary for the presentation of the results in intelligence, spelling, and handwriting; but only one graph helps the reader to interpret the results in reading, while the chapters on arithmetic, high-school composition, and algebra contain none. The reader notes the absence of measures of variability in some chapters but finds them carefully calculated in others.

There is considerable evidence of editorial haste or carelessness in proofreading. Table 72 provides blank spaces for average deviations but does not supply them. Some tables indicate by the use of heavy type or parentheses the intervals in which the medians lie, others do not. Figure numbers and data are rather frequently misquoted.

One easily finds the usual statistical errors. They occur in tables 17, 20, 21, 52, 62, 89, and elsewhere. Figure 11 is presumably drawn from the data of table 52 but is incorrect. Figures 14-20 should each contain 100 dots. They contain various numbers. None of the errors detected by the reviewer is very significant but their effect upon the reader is such as to make him skeptical of the accuracy of computations which he is unable to check.

The book, however, is a valuable contribution to our library of test literature. It should be a source of inspiration and suggestion to the school people of Virginia and of the nation.

R. L. MORTON

*Ohio University*

FROST, NORMAN. *A comparative study of achievement in country and town schools.* (Teachers College, Columbia University, Contributions to Education No. 111) New York: Teachers College, Columbia University, 1921. 70 pp.

This little book constitutes a really valuable addition to the literature of educational tests and measurements. Its aims as set forth by the author are: "First, to show that the difference in performance in school subjects of children of different ages can be obtained; second, to show that this difference is a measure of school efficiency which may be used to measure schools or school systems; third, to apply this measure to a system of country schools; fourth, to compare the results in this country system of schools with the results in certain city school systems."

The author starts out by summarizing the results of similar comparative studies of achievement in city and country schools. Then, in introducing his own study, he calls attention to the fact that all previous comparisons have been made on a basis of grade standards, which basis assumes equality of grades in the school systems compared. The author holds that such equality of grades is not general, particularly as between city schools and country schools. He avoids this difficulty by substituting age differences in achievement for grade differences as a basis of comparison. He thus obtains data readily comparable with results obtained in other systems, regardless of the diversity of conditions in the different systems, such as length of school year, teaching standards, curricula, amount of retardation, and the time of year at which the tests were given. This idea alone is worth many times the price of the book to thoughtful investigators.

The country schools tested for the purposes of this study were the 68 public "white" schools of Madison County, Kentucky. Most of them had a school year of only six months. The results are tabulated separately for the schools having a six-months term and for those having a nine-months term. Hence some interesting and significant comparisons are made between the achievements of the pupils in the two classes of schools over a period of three years.

Three tests were used, namely, Trabue Completion-Test Language Scale B, Curtis Standard Research Tests in Arithmetic Series B, and Thorndike Silent Reading Scale Alpha 2.

The results are compared with data obtained from surveys made in seven cities and large towns where the same tests had been used. All the data are set forth separately for each test in numerous well-arranged tables, together with summarizing tables which strikingly exhibit the relative efficiency of the several school systems as measured by the tests. The evidence as presented

is strongly in favor of the larger school systems and the longer school year. Hence, it is concluded that city and town schools are much superior in point of efficiency as measured by pupil achievement.

The truth of this conclusion depends largely upon the accuracy of the data with which comparisons were made and the validity of these tests as real measures of what the school accomplishes for the child. However, both these points are recognized and admitted by the author. He was presumably limited in his choice of tests by the necessity of using those which could be given to children of all grades, and by the necessity of using tests which had been rather widely used in other surveys in order to have data for comparative purposes.

The book is written in a very readable style. The author and his co-workers appear to have considered and tried to eliminate as far as possible every factor that would tend to lead to inaccurate and misleading conclusions. On the whole this study seems to represent careful and thorough work in attempting to add something worth while to what we *really know*.

S. S. BROOKS

Winchester, New Hampshire

BRANOM, MENDEL E. AND BRANOM, FRANK K. *The teaching of geography*. Boston: Ginn and Company, 1921. 292 pp.

Since the World War keen interest in the study of geography has been marked by new text books, new courses of study, and new books on methods of teaching. This is one of the latest books on the teaching of geography. It has been written by two men who have had wide experience in teaching geography, to normal school students.

The authors' point of view is indicated in the three following statements which appear in the preface: (1) "It is possible to organize the geography course of study in such a way that the dominant view point will be geographic and at the same time will permit of the interpretation of materials about life centers"; (2) "geography is primarily a study of the interlacing relations of life forms and nature. It is a study of place relations and the adjustments which man makes to the geographic regions with their varied resources"; (3) "An attempt is made to relate the work to the child's interests and experiences and to give the child a worthwhile motive, so that he will attack the problems whole-heartedly."

The modern view points and aims of geography teaching are clearly explained in the early chapters of the book. Later chapters suggest the criteria for a modern course of study, sources of materials for enriching the study, the organization of the class for study and recitation periods, and teaching pupils how to study geography. The authors explain and illustrate the different methods which may be successfully applied to the teaching of geography, such as: the problem method, the argumentative lesson, the topical outline, the journey method, type studies, the story, dramatization, and the project method. It is the authors' opinion that no one method should be exclusively used, but that methods should be varied to fit the type of material to be presented. The concluding chapter is devoted to measuring the results of geography teaching.

The few geography tests now available are discussed, and types of test exercises which might well be used are suggested.

The value of the book is greatly increased by suggestive questions for study and by bibliographies at the end of each chapter. Teachers of geography and normal school students will find this book an excellent aid both in furnishing practical suggestions for teaching and in presenting the modern view point of geography.

P. R. STEVENSON

*Ohio State University*

MITCHELL, LUCY SPRAGUE. *Here and now story book*. New York: E. P. Dutton and Co., 1921. xii + 360 pp.

Mrs. Mitchell has given us in this book new purposes in story telling, and suggestions for experimentation. The *Here and now story book* is neither a new collection of stories nor merely a collection of new stories. It is rather a full and well illustrated report of the author's experimentation in story telling and story composition with children from two to seven years of age.

The first half of the introduction is devoted to a discussion of the content of the stories, which are distinctive for being the expression of the experiences and interests of the children for whom they were told or written and who themselves assisted, either directly or indirectly, in the composition of many of the stories. The stories for the youngest children were composed and told while the child was meeting the experience, one purpose being to deepen the experience by "giving it some pleasurable expression" and another to afford the child an opportunity for creative expression. Mrs. Mitchell emphasizes the fact that she attempts "to follow honestly the leads which here and now the children themselves indicate in content and in form, no matter how difficult or strange the going for adult feet."

In the latter half of the introduction the form of the stories is very fully discussed. In criticising the popular custom of casting children's stories in a mould to the adult's liking, Mrs. Mitchell says, "The adult more often than not has presented his stories and verse to children in forms which the children could not like because they literally could not hear them!" It is suggested that we get the form or pattern for our stories from two sources, the children's own spontaneous art forms, and those story and verse patterns which make an almost universal appeal to children. A number of illustrations are given of the spontaneous compositions of children ranging in age from twenty-two months to six years. Emphasis is laid upon the need of subject repetition, and the use of refrains as sign posts by which the child can keep the continuity of the stanza or the story.

The reader may be shocked by the use of some expressions common among children but not heretofore accepted as permissible for the adult in telling stories to children. For example, the author defends this "subject repetition" as being used by the child in helping himself back to the subject and illustrates its use by the child's statement, "The little boy who lived in this house, he did so and so—." In her stories, however, Mrs. Mitchell sometimes uses

the pronoun immediately after the subject, thus separating a subject and predicate which might otherwise be in juxtaposition. We know that some children who never hear subject repetition never themselves use it, and also that there are other ways in which the mind may be taken back to the subject. Her argument for this is not convincing. Mrs. Mitchell does not say how far one should vary from the grammatically correct in telling stories to children who rarely hear a correct English sentence before they go to school. All the illustrations are taken from her own experience in the City and Country School.

Much stress is laid upon the importance of getting the children to create stories of their own, to play with words. The influence of their observations and expressions is observed in such passages as the following:

"The lightning is all shiny."  
"In the summer-time the wind goes like breathing,  
But in winter storm it growls and roars."

Although these stories and poems were written particularly for the children of the City and Country School, a number of them deal with experiences and observations so common among children generally as to be equally suitable to thousands of children elsewhere and far from New York. Among the poems and rhymes are some gems that give promise of becoming childhood favorites. Throughout the stories there is much use of tone and color and the style is rhythmic, simple, and beautiful.

Altogether, Mrs. Mitchell has given us in the *Here and Now Story Book* something new to work upon. With suggestions for stories for the youngest children, and an enlarged field for story work in general, we may feel more free to discard some of the traditional stories which have been used only for want of something better. The art of story telling may become a finer art than ever before, demanding an observation and study of childhood experiences and expressions, a judgment as to suitability of material and form, an originality, and a skill with language which may bring forth a truly beautiful and appropriate literature for childhood — a literature adapted to varying types of children living in varied environments. The need for something more and something better than we have had should lead others to follow up Mrs. Mitchell's experiment in order that we may have the full benefit of whatever it has to offer.

MYRTLE L. KAUFMANN

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*Educational survey of the Philippi school system.* Philippi, West Virginia: Board of Education, 1921. 39 pp. Distributed by Public School Publishing Co., Bloomington, Illinois.

This survey is not pretentious; yet in a simple, direct manner it describes the educational needs of Philippi, in such a way that anyone, even though uninitiated into the mysteries of educational tests, can understand the situation and get helpful suggestions for remedial work. It was written primarily for the school patron and the teacher who has had little experience with

measurement work. As might therefore be expected, there is little help afforded to those who have been using educational measurements for some time, except it be in the conciseness of presentation.

After a brief statement of the industrial and historical features of the city, in which considerable pride is manifested, the school building is described. The contrast is striking. The building no longer adequately cares for the legitimate educational activities and its poor condition is thought to account for the abnormal amount of sickness. In three chapters, are presented "The Classification of Pupils," the "Results of Education Tests," and the "Superintendent's Records" and summary. A comparison of a chronological age-grade table with a mental age-grade table shows that the excessive retardation is not justified by the intelligence level of the pupils and that there is much need for a reclassification. The following educational tests were given: Courtis' Standard Research Tests in Arithmetic, Series B; Monroe's Standardized Silent Reading Test; Thorndike's Visual Vocabulary Test; Cavins' Test in American Poetry; Hudelson's English Composition Scale; Charters' Diagnostic Language and Grammar Test (verbs and pronouns); Ayres' Handwriting Scale (Gettysburg Edition); Buckingham's Extension of the Ayres Scale for Spelling; Harlan's American History Test; Courtis' Supervisory Tests in Geography; Bugg and Clark's First Year Algebra Test. Only in the more formal phases of English work was the school up to standard. In the discussion of each test are very practical suggestions for remedial measures.

This survey was carried on by the Department of Education of West Virginia University under the direction of Professor L. V. Cavins. It is typical of the assistance the university is ready to render to schools of that state.

W. W. COXE

*Ohio State University*

WAGNER, CHARLES A. *Common sense in school supervision*. Milwaukee: The Bruce Publishing Company, 1921. 201 pp.

"The art of supervision is quite young and the function is not yet sufficiently differentiated to have yielded any large body of accepted facts or to have developed any long series of settled procedures." (p. 187). "Wrought out of experience and wrought into print, they (the chapters) represent just what one supervisor has found workable." (p. 179). "The most that is claimed for those chapters is that they do constitute an attempt at an answer (to the problems of supervision), though they do not assume that it is the only answer nor that it is the best answer." (p. 179). "If speaking from experience be regarded a valid reason for speaking at all on a subject, then these chapters have the fullest possible warrant; thirty years of practicing, of speaking, and of writing the ideas presented." (p. 3).

The book is just what its title indicates — a frank, practical exposition of the subject by one who has had much experience.

The various chapters overlap to a considerable extent, which is indicative of a lack of clear analysis of the subject. The reader is occasionally startled

by the use of an unusual word, as, for example, *frequnce*, which is used nine times on page 21. Some sentences give one a positive shock. The following illustrate the cause of the shock:

"Nothing but supervision can secure unity, use of the same textbook does not secure it, use of the same course of study can not assure it." (p. 157).

"Your careful note taking and your serious effort to help yourself, will impress upon him (the supervisor) that you are both careful, studious and seriously in earnest." (p. 170).

The author's general point of view is that supervision exists because teachers are unprepared and to meet "the demand for unity, continuity, sequence of instruction and for equivalence of opportunity for all the children of a school system" (p. 8). The better preparation of teachers for public school service seems to the author quite impossible. "The normal schools can not possibly find places and classes enough for the students to get any real training in the normal school." (p. 188). Therefore, the only way to an increased effectiveness of public school work is through more and better supervision.

The great objection to supervision is the personal, as opposed to the professional, point of view. Just how this objection is to be removed, so long as teacher and supervisor both remain human, is not convincingly set forth.

Many persons now engaged in supervision and without adequate preparation for their present responsibilities will read the book with interest and profit.

JOHN A. H. KEITH

*State Normal School, Indiana, Pennsylvania*

## News Items and Communications

This department will contain news items regarding research workers and their activities. It will also serve as a clearing house for more formal communications on similar topics, preferably of not more than five hundred words. These communications will be printed over the signatures of the authors. Address all correspondence concerning this department to Doctor E. J. Ashbaugh, Ohio State University, Columbus, Ohio.

A circular letter sent to the school people over the country asking for communications has been receiving a splendid response. If you, reader, either did not receive or have not answered such a communication, please feel it your responsibility to send such material to the department editor.

Superintendent Ira J. Bright, Leavenworth, Kansas, reports progress on the one-half million dollar building program. The bond election carried approximately two to one in spite of business depression and increased tax rates. During the short campaign publicity in newspapers, movies, printed pamphlets, window cards, wind shield pasters, three minute speakers, and school parades were all used. The slogan throughout was "True Americans will vote for modern schools."

Superintendent F. W. Johansen, Cherokee, Iowa, resigned January 30 to become Vice-President of the First National Bank of that place. It is a distinct loss to have school men who have made the record of Mr. Johansen leave the service.

We have recently received a copy of a Physics test devised by H. W. Tilton, University of Pittsburgh. It is of the sentence-completion type and anyone interested in this phase of the measurement work should write to Mr. Tilton.

Superintendent W. H. Richardson, Cuyahoga Falls, Ohio, reports that they have been using the "work-study-play" plan of organization for six years and have found it entirely satisfactory. A new high school building is nearing completion, the controlling principle in the construction of which was "complete use of every part of the building and a duplication of uses of rooms." The building will cost \$300,000 and accommodate 600 pupils.

Superintendent Theodore Samm, Council Bluffs, Iowa, reports that the first year of their School Savings Department showed a total deposit of \$76,986 with 4,477 children depositing. That 4,063 children had active accounts amounting

to \$26,008.22 on December 31 shows that the thrift spirit in the schools survived through the Christmas shopping period. We shall be glad to receive similar information from other communities which have school savings.

We are just in receipt of a copy of "The Idaho Teacher" and note that the contents indicate that the magazine lives up to its statement of aim, "A journal devoted to the interests of education in Idaho." All phases of education from kindergarten to university are reported with live news. The report of the State Association's Committee on teacher shortage and salary shows 10.8 percent new to the profession, 55.7 percent new to the position, and only 5 percent holding present position more than three years. It is interesting to note, however, that the supply practically meets the demand and that salaries have remained the same as last year.

The superintendent of public instruction of Oregon has sent us their Arbor Day Manual for 1922. Aside from material suitable for Arbor Day exercises, it contains a large number of records of native shrubs with descriptive material which will go far in helping the children to recognize the flora of their own state. This is especially commendatory.

Superintendent J. O. Engleman, Joliet, Illinois, was elected president of the Illinois State Teachers Association at its holiday meeting. For the past three years he had been chairman of its legislative committee.

A committee of five, three principals and two teachers, elected by the teaching staff is working, by invitation of the Board, with Superintendent Engleman and a committee of the Board upon a revision of the Board's Manual. The step was taken in order that the teachers might have a voice in the rules, especially those that govern salaries, sick leave, teachers meetings, and other matters concerning the teachers themselves. Every teacher on the staff is working this year upon a revision of some phase of the course of study.

Professor R. A. Kent, Dean of the School of Education, University of Kansas, writes that plans are being formulated for a conference at the university "of school superintendents and others who may be interested in the discussion of the problems connected with educational research particularly in the public school field." Conferences of this sort are becoming surprisingly general and the extent to which they are attended indicates their popularity.

Richard D. Allen, Director of Vocational Guidance for the Public Schools of Providence, Rhode Island, points to the fact that the program of vocational guidance in Providence manifests a widely different "slant" from that which work of this sort usually takes. He does not believe in combining the work of vocational guidance with the duties of the attendance officer, the school census officer or the director of vocational education. He rightly points out that when so combined the guidance work tends to become supplementary or incidental to other activities. It is Mr. Allen's idea that the whole matter of

vocational counciling should be carefully surveyed from the point of view of the *educational system* rather than from that of juvenile employment. He proposes such a survey as a research problem.

We have received a new form of report card from Superintendent Richard C. Tobin, of Ansonia, Conn.

This card is a small four page folder which provides for five ratings during the year and for a summary at the close of the year.

The distinctive feature of the card is the fact that not only in respect to scholarship but also in respect to certain other qualities such as attitude toward school work, character of the pupil's response in class, and his conduct are rated by each teacher separately. The arrangement by which this is accomplished is decidedly ingenious. We think that it will be of some interest to the parents of pupils in the Ansonia schools to note the extent to which their children show differences in attitude, conduct, etc., as they come in contact with different teachers.

#### Regional Conferences on Educational Measurement

There are 207 district superintendents of schools in New York State. These superintendents have general supervision of all schools in rural communities and in villages under 4500 population.

In the spring of 1921 the State Education Department arranged a series of regional conferences for district superintendents on the general subject of classroom supervision. At each of these conferences one hour was given to the discussion of the supervisory uses that might be made of standard educational and group intelligence tests, and it was suggested that the Department would be willing to send a representative to meet with superintendents to discuss the question at greater length. Following these conferences the Department received so many requests for assistance that it was impossible to meet them all with the help at hand. In early September, a circular letter was sent to all district superintendents stating the difficulty that the department had met and suggesting that a number of regional conferences might be arranged at the several normal schools of the state, if district superintendents so desired.

Within a week replies had been received from 120 superintendents asking that such conferences be arranged and stating the subjects in which they would be most interested to study tests. Conferences were arranged at eight centers; Oneonta, Buffalo, Brockport, New Paltz, Cortland, Potsdam, Plattsburg, and Albany. The first of these conferences was held October 10 and 11, the last December 8 and 9. The program was arranged specifically, so far as possible, to meet the needs of district superintendents. In the correspondence practically all of the superintendents had signified a desire to study tests in reading and arithmetic; and a large majority desired group intelligence and spelling tests.

Each conference lasted two days. The first morning session was primarily devoted to a discussion of the criteria to be used in selecting tests for supervisory purposes; and to studying carefully the technique and directions for giving certain of the tests to be demonstrated during the conference. The

afternoon session was given to demonstrating four or five of the tests selected or agreed upon at the morning session. In each conference the Monroe Silent Reading Test Revised and either the Burgess Silent Reading Test or the Thorndike-McCall Reading Test were demonstrated. The arithmetic tests considered were the Courtis Research Tests, Series B; the Courtis Standard Practice Tests; Woody Arithmetic, Series A; and Woody-McCall Mixed Fundamentals. Two or more of these tests or scales were demonstrated at each conference. The usual form of procedure was for the specialist in educational measurements from the department to demonstrate the giving of the National Intelligence Test, Scale A, and the Monroe Standardized Silent Reading Test Revised to the same pupils. This demonstration was usually followed by a superintendent (usually one who had had previous experience) demonstrating the giving of two of the reading tests,—the Monroe and the Thorndike-McCall, or Burgess Scale to a second class. Next, two or more of the arithmetic scales were given to different classes by superintendents. In each case the choice of scales had been determined by the majority of the group in the morning discussion. The demonstrations were invariably followed by a spirited conference on the technique of giving tests. Usually enough errors had been made to make this discussion quite effective. When time allowed, one set of papers was scored in the afternoon session.

The second morning was given to scoring papers, tabulating results, and interpreting data. Points that aroused unusual interest in the discussion were the relation between rate and comprehension scores in reading; between reading scores and group intelligence test scores; and the means of using the arithmetic tests for diagnosing the needs of classes and individual pupils. In most of the conferences the classroom teachers or critic supervisors joined in these discussions so that superintendents had the opportunity to compare the tests results with the teacher's knowledge of the individual pupils. Throughout these morning discussions there entered from time to time questions and discussions of what the superintendent might do with similar data from his own schools toward improving classroom instruction.

The second afternoon session was usually not more than two hours in length and was devoted to an informal round table discussion of educational measurements.

It was the aim of these conferences to give superintendents such specific, concrete acquaintance with the giving, scoring, tabulating, and interpreting of two or three tests that they might, with a considerable degree of confidence go home and use these tests in their own supervisory work. The dozens of letters already received by the department describing what superintendents are doing, or asking for further specific information indicates that a considerable majority of them have already undertaken some measurement work.

One feature seemed significant in the conferences. During preceding years between 20 and 30 district superintendents had used one or more standard educational tests. With only one exception these twenty-odd superintendents attended the conferences and took a leading part in the discussion.

Conferences were attended by 158 district superintendents, three city or village superintendents, 23 village and elementary principals, and 10 super-

visors or teachers—a total of 194. These figures do not include those people who came in for only one or two sessions, or the many normal school teachers and supervisors who attended part or all of the conferences. Five cities and villages which were represented in the conferences either directly by the superintendent or some one representing him have already introduced a part of the measurement program in their work or have indicated their intention of doing so.

It is estimated that reading and arithmetic tests demonstrated in the conferences will be used as a basis for improvement of instruction, during the current year, in not less than 5000 classrooms of the State.

J. CAYCE MORRISON

*State Department of Education, New York*

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#### Rhode Island and Massachusetts

The Journal of Educational Research for October very courteously published my comment upon "The Education of Teachers" and a reply by Doctor W. Randolph Burgess, in which he says, in defense of his position: "This statistical method has always been open to the criticism of the person who calls attention to specific cases which the method does not measure." May I venture to suggest that a statistical method that will not stand the test of correlation to fact bears unmistakable indication of a want of validity. I did not, however, criticise the statistical method generally, nor the particular statistical method used by Doctor Burgess. I did criticise his application of the method and his failure to use facts when facts were available; and I pointed out that the application of facts that are unquestioned would change the results of his study as to index numbers and relative standings for the States. In this connection may I not be permitted to say that Commissioner Payson Smith of Massachusetts in a public address has accepted the validity of the corrections that I suggested to Doctor Burgess, and has recognized Rhode Island's leadership in preparing teachers for service and in the preparation-personnel of the teaching staff. His predecessor, Commissioner David Snedden, did likewise in his report for 1914, in which he wrote: "Except Rhode Island, no state surpasses Massachusetts in provision for the training of teachers." Were I in Doctor Burgess' position, I should rejoice that the correction of a single fact item would square my statistical theory with fact. There is certainly a genuine comfort in proving the statistical method valid and accurate, by applying to it the test of experience and fact and finding correlation. Indeed, when statistical theory and fact do not coincide, I question the validity of the theory.

With reference to Doctor Burgess' second article, published in the October Journal, "The Rate of Progress in Teacher Preparation," it is worthy of comment that he did not use for Rhode Island in Table I a corrected index figure warranted by the fact that in Rhode Island graduation from normal school has meant  $2\frac{1}{2}$  years of professional training beyond graduation from high school. The index number for Rhode Island should be 2.39 instead of 2.00, as Doctor Burgess calculates it. Rhode Island should have first place, instead of second.

Similar index figures for Rhode Island for eleven years from 1910 to 1920, are interesting as showing steady advance and also as indicating the probable path of progress. These numbers and the facts on which they are calculated follow:

Year	College Graduates	Normal School Graduates	Number of Different Teachers	Index Number
1910	341	1471	2371	2.13
1911	348	1510	2394	2.15
1912	363	1563	2428	2.21
1913	368	1620	2469	2.24
1914	396	1783	2586	2.34
1915	386	1839	2680	2.30
1916	412	1939	2773	2.34
1917	428	1998	2844	2.36
1918	441	2055	2934	2.35
1919	422	2161	2966	2.39
1920	422	2164	2971	2.39

These index numbers if used in Table I as printed in the October Burgess article would establish leadership for Rhode Island in every year from 1910 to 1920, and also indicate in a general way that Rhode Island in 1910 had a higher index number than its nearest rival had in 1920; or that Rhode Island is approximately ten years ahead of any other state in the personnel of the teaching profession.

In Doctor Burgess' Table I, the index numbers for Massachusetts indicate in a general way the progress that a state system may make in ten years, starting with an index number of 1.65. These Massachusetts index figures are strongly corroborated by a similar group of index numbers for Rhode Island in the period from 1899 to 1909. Placed side by side in a table the correlation is obvious and striking:

Rhode Island		Massachusetts	
Year	Index Number	Year	Index Number
1899	1.66	1910	1.65
1900	1.71	1911	1.65
1901	1.74	1912	1.68
1902	1.80	1913	1.68
1903	1.87	1914	1.75
1904	1.92	1915	1.82
1905	1.92	1916	1.90
1906	2.03	1917	1.98
1907	2.06	1918	2.05
1908	2.04	1919	2.05
1909	2.10	1920	2.05

New Hampshire, starting with 1.71 in 1920, may reasonably be expected to advance to 2.10 by 1930, if it follows the general experience of Rhode Island and Massachusetts; perhaps from 2.10 to 2.40 by 1940, if the progress made in Rhode Island is duplicated; and from 2.40 to 2.60 by 1950, assuming that the

apparent law of diminishing returns operates as indicated in the experience already accumulated. The three states should stand as indicated in the following table at 10 year intervals from 1910 to 1950:

	1910	1920	1930	1940	1950
Rhode Island	2.10	2.40	2.60	2.70	2.80
Massachusetts	1.65	2.05	2.35	2.55	2.65
New Hampshire	1.00	1.70	2.10	2.40	2.60

Massachusetts and New Hampshire should gradually approach Rhode Island, which will continue to maintain leadership because of a long advance, though rising more and more slowly, as will be true also of her two closest rivals. On these statistics and facts I venture to say that Doctor Burgess is in error in his estimate that Rhode Island will be in fifth place by 1950.

Finally, a few facts may indicate the course of future events. New Hampshire has made splendid progress in recent years doubtless largely because of the operation of a law providing state support for schools taught by normal school graduates. Massachusetts is at present becalmed, awaiting a fresh impulse. Rhode Island has reorganized its normal school as a college of education. An immediate effect thereof has been to double the entrance class; and the indications are that within five years enough trained teachers can be graduated from the 2½-year course, as that is continued, to replace all teachers with less than normal school or college graduation. That means at least an index number in excess of 2.50. Moreover, the college in June will graduate a first class of teachers with four years of training, and will continue to do that year after year. Ultimately the 2½-year course will disappear and normal-school graduation in Rhode Island will mean four years preparation. Still more, 1100 teachers in service, mostly normal school graduates, are comprising more than 36 percent of all the teachers in the state, are enrolled for summer school and extension courses, leading to the completion of four years of preparation for teachers. In other words, Rhode Island has already undertaken measures that will produce an index number 4.00. May all the states join in the race; for that will mean an advance in teaching that will produce inestimable improvement in our public schools.

CHARLES CARROLL

*Rhode Island College of Education*

#### Handicapped School Children and How to Meet Their Needs in Ohio

One of the most significant contributions to the science of education made during the last quarter century—especially the last decade—is the demonstration of the large individual differences which exist in the health, physique, intelligence, and emotional, social, moral, and pedagogical development of school children. Many factors are responsible for the variations which represent inferiorities and disabilities, e.g., the biological tendency toward variation, largely ineradicable, neglect, diseases, defects, and defective conditions in the ancestry and in the environment. Among the most important types of handicapped children needing special treatment are the blind, semi-sighted, deaf,

semi-deaf, anemic, crippled, feeble-minded, backward, delinquent, speech defective, and word-blind. These groups of maladjusted children create the most difficult problems which the schools and society have to face. The responsibility for the improvement or rehabilitation of these children devolves far more upon the schools than upon any other agency. How shall the schools discharge this responsibility?

Not by ignoring the individual differences and treating the children as normal, as has been done from time immemorial, but by discovering, understanding, and making adequate provisions for all the significant types of variations, either by furnishing special aid in the regular program of studies or by supplying differentiated instruction and training in different kinds of special classes. In order adequately and economically to organize a system of special classes in Ohio it is necessary to carry out a state-wide program which shall include: (1) The establishment of various types of special classes to meet the needs of the handicapped children found in all sections of the state. (2) The manning of the classes by teachers especially trained for the type of specialized work in which they are engaged. Ohio has made special provisions for the training of teachers of handicapped children by establishing (in February, 1920) a Bureau of Special Education under the administration of Miami University, which will be located in Dayton in June where the public schools will afford adequate clinical facilities, and a sufficient number of different types of special classes for observation and practice teaching. (3) The adequate examination and certification of the pupils before assignment, by local and state examining bureaus. The state has already established the Bureau of Juvenile Research, charged especially with the examination of delinquents committed to the guardianship of the department of public welfare, or any minor received by this department for observation, and the Bureau of Special Education, which aims to advise with public school authorities regarding the organization of special classes and to test and examine school children, while many public school systems and higher institutions of learning also support departments of tests and measurements. (4) The enactment of further legislation in the interest of handicapped school children. Ohio now grants exceedingly generous "state aid" for the support of classes for the blind, deaf, and crippled. We need a law, mandatory in character, providing for the establishment, under state subsidy, of special classes for the feeble-minded, for the delinquent, for the backward, and for the organization of work for the correction of speech disorders.

Various facts, gathered from a study of the results of special class work in a large school system, were presented in proof of the statement that differentiated and corrective training for maladjusted children is eminently worth while from the standpoint of the social returns.

J. E. W. WALLIN

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### Methods of College Teaching

It is said and seldom gainsaid that college teaching is of poor quality. Yet it is certain that some college teachers are more successful instructors than others. From this it is but a step to the conclusion that the successful have something to teach the less successful and the inexperienced. If, in each institution of higher learning, some way could be found to capitalize the ability of the best teachers and to make their methods better understood throughout the institution, it is unquestionably true that the institution would better fulfill the purposes for which it was created.

Yet whoever heard of conscious attempts in colleges and universities to improve instruction? Supervision is non-existent, and for one instructor to visit the classes of another is almost unheard of. Under these circumstances, the work of Dr. W. W. Charters at Carnegie Institute of Technology—a work which has for its purpose the improving of instruction in that institution—is worthy of attention.

From a report which reached our hands some time ago, it appears that Dr. Charters conducted a seminar in Methods of College Teaching. The first work of this group of students appears to have been a sort of job analysis of college teaching. In the mimeographed report of the work of the seminar, eleven items are recognized in this job analysis—such items as *learning to know students, apportioning time to material, methods of daily preparation, testing and grading, the assignments, etc.*

The plan was to select from the faculty of the institution a number of the most successful instructors and to find out from each of them what provisions they made in their teaching for the items which the job analysis had revealed.

The method by which the information was obtained from these successful instructors was in itself a matter of no small importance. It would have been easy to send each one of them a questionnaire, and this undoubtedly would have been the easiest method to adopt. Undoubtedly too, it would have yielded disappointing results. The method actually followed was to provide for a personal interview of each of the instructors who had been selected as having something to contribute in the way of successful methods of teaching. Moreover, the interviewers were themselves trained, each being provided with a standard form and instructed in its use.

The resulting report is worthy of a larger circulation than it has received. Many a teacher, even though he is already highly successful, would benefit by knowing the ways in which others who are undoubtedly successful accomplish their results.

Incidentally one gathers from reading the report the impression that the college instructor as represented by these successful individuals, is surprisingly conscientious and painstaking. The careful planning of work, the time consuming methods of recording and filing data, the elaborate preparation, the self-analysis, and the self-denial with which these men and women approach and pursue their task shows that least in these instances college teaching is both more exacting and more excellent than its undiscriminating critics have supposed.

B. R. B.

### The Place of Final Examinations

The reforms in secondary education brought about during the last decade have shown a marked tendency towards more liberal practices and away from all formalism that smacked of academic pedantry. The results thus far are evidenced in broader curricula, enriched subject matter, and methods of instruction that aim to give greater vitality to the courses of study. When it was recognized that the high school bore as important a relationship to the community as to the college or university and when the colleges granted most liberal terms for admission, the formal final examination passed out of existence in many schools as a useless appendage.

On the surface the final examinations in high school were valuable only so long as pupils were required to face the ordeal of entrance examinations for college. Since they gave no additional evidence of scholarship, they were of no assistance to the teacher in determining the passing grade; and they did undoubtedly subject some pupils to a terrible nervous strain. Besides they were costly in time and energy, and they could hardly be justified as an artificial stimulus to scholarship or a worthy rod to prod the indolent. So in many high schools final examinations were discontinued.

Not all schools so acting, however, have been altogether pleased with the results of this liberalizing reform. Some have thought that there was a deterioration in scholarship, a let-down from serious purposes of study, and a loss in the tone of the school. Administrative problems have increased rather than diminished. A thorough study of the place of final examinations has in some cases resulted in a return to the earlier practice.

Most of the arguments against final examinations are unanswerable. As applied to the worst type of examinations they are sufficient to discredit them entirely. But the important place of examinations in the learning process is usually ignored, and it is this psychological basis for examinations that establishes their right to existence and furnishes the explanation for the school conditions resulting from their discontinuance.

Doctor S. S. Colvin, after discussing at length the various laws of memory, says, "In the elementary and secondary schools examinations, not as tests, but as incentives for keeping in mind the work that has been pursued over an extended period, should be emphasized more than they are at present."<sup>1</sup> Doctor W. C. Bagley, writing in criticism of the project method, expresses the same psychological principle from a different angle: "There is some indirect evidence that information gained primarily to solve an immediate problem is not so long retained or so easily recalled as is information that is mastered with the intent to make its mastery permanent. I have abundant experiences of my own that confirm this conclusion. . . . In fact the validity of the principle of 'learning with intent to remember' has been fairly well established by experimental evidence. . . . Psychologically, learning with the intent to master permanently comes very close to learning for its own sake."<sup>2</sup>

<sup>1</sup> Colvin, Stephen S. *The learning process*. New York: The Macmillan Company, 1918. p. 176.

<sup>2</sup> Bagley, William C. "Projects and purposes in teaching and in learning," *Teachers College Record*, 22: 289-90, September, 1921.

The results of an inquiry into the practice of a number of large high schools are given herewith. The evidence rather favors the formal final examination. The sins of malpractice seem to be well known but without terror to the alert supervisor.

From 48 high schools, 44 replies were received; 25 of which indicated that final examinations were held, the remaining 19 indicating that they were not held. The schools that give final examinations report positively that in 22 of the 25 instances the system works in general to the satisfaction of teachers and patrons. The remaining three schools express doubt on this point, but none of the 25 schools is positive that the system is not working well.

Examinations are prepared about equally often by teachers and by committees. Most commonly two teaching periods are devoted to the examination, and the results count from one-fifth to one-third toward the semester's rating. Far the greater part (17 out of 25) of the schools which use final examinations do not exempt from examinations students of superior ability. None of these schools conducts examinations under the honor system.

Among the arguments given for final examinations are the following: (1) they prepare for college examinations and for competitive examinations of all kinds; (2) they develop ability to meet crises, to summon the best that is in one; (3) they lead to wise review and better organization of subject matter; (4) they secure better application and concentration on the part of teachers; (5) they tend to hold pupils to the end of the year; (6) they tell teachers where the weak points are; (7) they afford an incentive for pupils to make up work lost during absence or neglect; (8) they give a working standard that changes only gradually from year to year and is independent of the personality of any one teacher.

It is perhaps significant that the principals of the schools which do not give final examinations are not as certain of the success of their plan as are the principals of schools which have the examinations. Seventeen of the schools which do not give final examinations answered the question as to whether their system was working generally to the satisfaction of teachers and parents as follows: yes, 8; no, 3; doubtful, 3; principals personally preferring them, 3.

From the schools which do not give final examinations the following were listed as the best arguments for their policy: (1) cramming is not encouraged; (2) nervous strain is avoided; (3) the teacher can judge the ability of the student without the final examination; (4) such examinations constitute an unwise expenditure of time; and (5) they are unfair as a sole basis for promotion.

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## INSTRUMENTS FOR MEASURING THE DISCIPLINARY VALUES OF STUDIES<sup>1</sup>

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The transfer of mental training and the disciplinary value of studies are topics which deserve much more investigation and experimentation than has been given to them. Almost all scientific workers in psychology and in education will agree with this statement and could produce many arguments in its support. These I shall not rehearse, but I may add one new argument, namely that the direct practical utilities and informational values of school studies, which we contrast with their disciplinary values, seem to operate with very rapidly diminishing returns. For example, to know the first thousand English words in importance is an enormous advance over knowing none, but with each succeeding thousand the utility drops rapidly. Learning the eleventh thousand, say in Grade IX, doubtless adds much, but a man can be an excellent citizen, parent, friend, and worker without them. Words in the twenty-first thousand, learned say in college, will, with the exception of those concerned with the individual's specialty, be seen or heard very, very rarely by those who have learned them. In algebra, certain abilities such as the ability to understand simple formulas or to read a graph expressing the relation of one variable to another, are very often useful in general reading and the study of the sciences, but, as with vocabulary, the utility decreases very rapidly as we extend algebraic knowledge. This seems true of many other studies, the curve of direct utility being of the general form of Figure 1. Hence even

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<sup>1</sup> The work reported in this article was aided by a grant from the Commonwealth Fund.

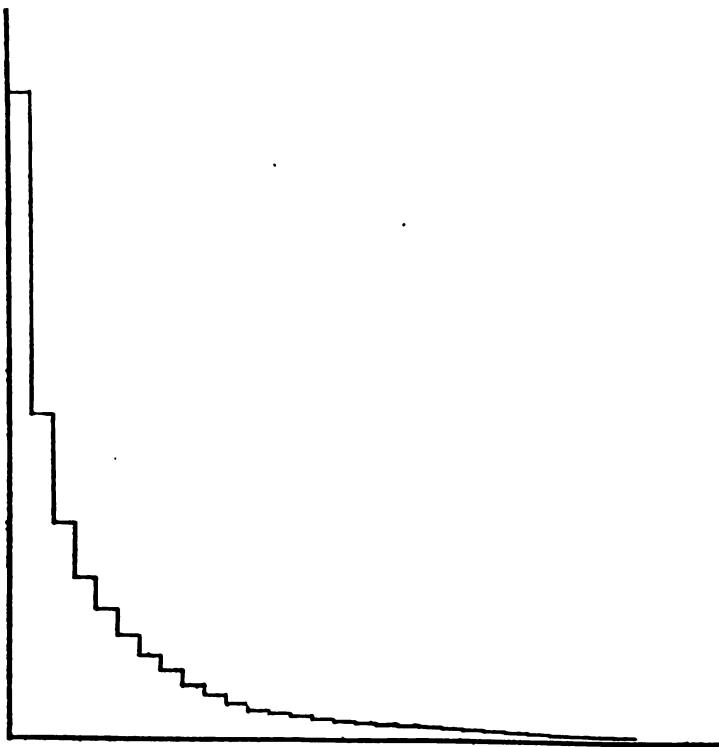


FIGURE 1.—GENERAL FORM OF THE CURVE OF DIRECT UTILITY

a very small amount of transfer effect may equal in importance the direct utilities after a certain point in the latter.

In order to facilitate investigations of the transfer effects or disciplinary values of algebra, we have sought to provide means of measuring them. It appeared that the study of algebra might be expected, in so far as it improved more general abilities at all, to improve the ability to think with symbols, to understand and apply generalizations, to discern and use relations, to select essential facts or elements, and to organize facts for a purpose—in James' phrase to "think things together." The claims made by advocates of algebra as a form of training seem to fall under these heads; and psychological deductions lead in the same direction. Consequently we tried to find or construct instruments for measuring these abilities (which we may call symbolism, gen-

eralization, relating, selection, and organization) with algebraic data and with data remote from and unlike the numbers, letters, formulae, equations, problems, and curves of algebra.

In the course of this work the question arose whether, by slight sacrifices in respect to their fitness to measure general intellectual improvement due to the study of algebra, these same instruments could not be made useful for measuring the general intellectual improvement due to the study of English grammar, or Greek, or Latin, or geometry, or arithmetic.

This seemed to be the case, and the tests as they appear later in this article are offered as useful to measure the general improvement in generalization, relating, selection, and organization produced in a pupil in Grades VII to XII by the study of grammar, languages, or mathematics.] A special instrument for measuring the training in symbolism due to algebra has been devised. It is of doubtful value for other studies and is not presented here.

Consideration was given to extending the tests to include ability in discriminating fine and subtle differences, in classification, in detecting and remedying errors in reasoning, and in selecting and arranging facts for arguments and proofs. It seemed advisable however to delay this work until we knew whether the tests so far made proved themselves useful.

[The tests are made up in two series, A and B. These are to be given to the experimental groups before and after whatever training is in question and, at similar dates, to the groups used as controls.] A practice series is also provided. It is to be given before both the 'early' and the 'late' trials to make sure that the nature of each task is understood. Series A and B are, of course, too long to be printed in full here,<sup>2</sup> but enough of the A series is presented to show the nature of the instrument.

We have not been able as yet to carry on the experimentation necessary to determine the comparative difficulty of the A and B series, element by element. We hope to do this later, but may

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<sup>2</sup>They are printed as four eight-page booklets, 8½x11, and a practice booklet of eight pages. They will be supplied at cost by the Institute of Educational Research, Teachers College, Columbia University (\$18.00 per hundred sets, including keys for scoring).

not. As totals they are presumably very closely equal in difficulty, and a collection of all the elements of A having mathematical content will probably be very closely equal to a corresponding collection from B. The same holds good for a collection of the elements having specially verbal content, and for a collection of the two pictorial tests and the analogies test. Knowledge of the difficulty of corresponding elements in the A and B halves is not essential, since the comparison is between the gains of the group having the training in question and those of the control group lacking the training.

It is of course the case that Part I does not measure ability in selecting essentials, unmixed with any other ability, that Part II does not measure ability with relations unmixed with any other ability, and similarly for Parts III and IV. On the contrary each part measures a mixture of abilities. It seemed better, however, to use tests that are known to measure abilities of consequence, than to run the risk, in devising tests to isolate certain sorts of ability, of measuring something artificial and possibly unimportant. We do not even know that such isolation is possible. Moreover, the general effect of Latin, or arithmetic, or algebra upon the score in the aggregate of these tests is, in and of itself, well worth study, even if our arrangement of them in respect to the four abilities is entirely in error. Inspection of the samples shown below will provoke the query, "Is not this collection of tests substantially an examination of intelligence? Many of its elements are stock features in such examinations; and the others look as if they would be suitable there."

This instrument is, in fact, a collection of tests all of which are known to be correlated with and indicative of intellect; the chief differences between it and a random selection of tests of intellect is that it omits information tests, vocabulary tests, learning tests (such as substitution tests), tests in which memory counts notably (such as the Army Alpha 1, or Beta 5) and tests of the comprehension of fairly long paragraphs. That tests suitable for our purpose should also be indicative of intelligence is not surprising, since the five abilities in question are

among the most important, if indeed they are not actually the most important, of the group of abilities which we call intellect. An examination for general intelligence would be notably defective if it did not test them. Conversely an examination of the influence of linguistic and mathematical training upon more general abilities would be notably defective if it did not resemble an intelligence examination in many respects. It would not be grossly unfair to measure their transfer effects by giving one of the standard forms of intelligence examination before and after the training in question and to a control group. It is, however, obviously better to omit information tests, vocabulary tests, substitution tests, and tests involving memory; it is also better to select the tests from the point of view of the alleged general training given than to use tests chosen for the correlation of their combined score with some criterion of intelligence. In addition we have tried to make the instrument better for its purpose than existing tests of general intelligence by providing in each part a test with mathematical content, one with verbal content, and one which is not specially mathematical or verbal in its content.

#### PARTS I AND II.—SELECTIVE AND RATIONAL THINKING

##### *Test 1. Twenty-one Arithmetical Problems*

"Find the answers to these problems. Write the answers on the dotted lines. Use the blank sheets to figure on." Nos. 1, 4, 7, 10, 13, 16, and 19 are:

1. What is the cost of four tickets at 50 cents each? Answer.....
4. How much will 24 lemons cost at 30 cents a dozen? Answer.....
7. At 6 for 25c, what is the cost of 3 dozen? Answer.....
10. What number minus 7 equals 23? Answer.....
13. 4 percent of \$600 equals 6 percent of what amount? Answer.....
16. A family spends \$600 on rent, \$3,000 on other expenses and saves \$200. If they increase their total expenses to \$4,200 and their savings in the same ratio, how much will they save? Answer.....
19. Jofas are 4 for 25c. Kelas are  $2\frac{1}{2}$ c each.  
A Jofa costs.....as much as a Kela.

##### *Test 2. Sixteen Absurdities (Thorndike after Woodworth)*

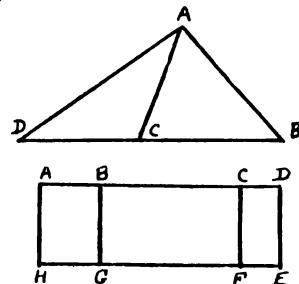
"Write 'imp' before each statement that could not possibly be true. Write 'poss' before each statement that might possibly be true (even if it is not probable)." Nos. 1, 4, 7, 10, 13, and 16 are:

.....1. Each singer shouted at the top of his voice, but the big fat man with the red necktie could be heard above all others.  
 .....4. The poor wanderer, finding himself without means of lighting his camp fire, made a fruitless search thru his equipment by the light of a single candle.  
 .....7. Using a field glass, the captain now clearly perceived what he had previously surmised—a group of mounted men moving cautiously along the river bank on their hands and knees.  
 .....10. By the light of a dim lantern, the farmer found the source of the nauseating odor.  
 .....13. He stood on the dry grass watching the rain, which had been falling steadily for two days and nights.  
 .....16. Starting half way between two posts, he walked slowly all around the field and each post that he met was shorter than any he previously had passed.

*Test 3. Five-line arrangements*

1. Draw 6 triangles using only 5 lines.

All the triangles in your drawing may be counted to make up the six. For example, in the upper drawing there are three triangles: ABC, ACD and ABD. In the lower drawing there are six rectangles, ABGH, BCFG, CDEF, ACFH, BDEG, and ADEH.



2. Draw 5 squares using only 6 lines.

3. Draw a hexagon, 2 squares, and 4 triangles, using only 9 lines. (Hexagon means a 6-sided figure.)

4. Draw a square surrounded by 4 triangles, using only 6 lines.

5. Draw 10 triangles, 2 squares and a hexagon, using only 11 lines.

*Test 4. Thirty-five Wylie opposites*

"Look at each of the words in the list below. Then write a word after each one which means just the opposite and which also begins with the letter *b*. If you come to any word which you cannot do, then go on to the next one. These three samples are given as they should be."

girl — boy  
 covered — bare  
 upset — balance

Numbers 1, 6, 11, 16, 21, 26, and 31 are:<sup>3</sup>

1. good	6. white	11. straight	16. loose
21. cultured	26. exhume	31. spiritual	

<sup>3</sup>This particular set may be replaced by another, but the nature of the task and its general difficulty will be the same.

*Test 5. Twenty number-series completions  
(Thorndike After Rogers)*

"In the lines below, each number is gotten in a certain way from the numbers coming before it. Study out what this way is in each line, and then write in the space left for it the number that should come next. The first two lines are already filled in as they should be."

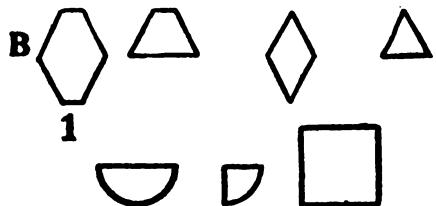
Samples: 2, 4, 6, 8, 10, ... 12...  
11, 12, 14, 15, 17, ... 18...

Lines 1, 5, 7, 10, 13, 16, and 19 are:

5, 10, 15, 20, .....  
103, 95, 87, 79, .....  
5½, 7, 8½, 10, .....  
21½, 21²/₅, 21³/₅, 21⁴/₅, .....  
10, 12, 12½, 14½, 15, 17, .....  
1³/₁₆, 1⁸/₈, 1⁹/₁₆, 1³/₄, .....  
7, 9, 10, 11, 13, 14, 15, 17, .....

*Test 6. Geometrical relations (Thorndike)  
(Two sets of ten each)*

"In lines 1 to 10 draw a fourth figure in each line such that the fourth figure is to the third as the second is to the first, as shown in lines A and B."



*Test 7. Thirty-two verbal analogies or relations  
(Thorndike, selection and extension from Briggs)*

"Write on the dotted line a word which fits the third word in the same way that the second word fits the first word. The samples show what you are to do."

Samples	long	longer	bad	worse
	push	pushed	run	ran
	boy	boys	ox	oxen

Nos. 1, 6, 11, 16, 21, 26, and 31 are:

1. child	child's	Poll and Hunt	.....
6. cook	cook's	Burns	.....
11. wings	wing	they	.....
16. driver's	drivers'	my	.....
21. stones	stone	strata	.....
26. prepare	preparation	flee	.....
31. fit	fitness	young	.....

*Test 8. Forty analogies or mixed relations  
(Thorndike, after Army Alpha, after Woodworth-Wells)*

"In each of the lines below, the first two words have a certain relation. Notice that relation and draw a line under the *one* word in the parenthesis which has that particular relation to the third word. Begin with No. 1 and mark as many sets as you can."

Samples	sky—blue: grass (grow, <i>green</i> , cut, dead)
	fish—swims: man (boy, woman, <i>walks</i> , girl)
	day—night: white (red, <i>black</i> , clear, pure)

Nos. 1, 10, 20, 30, and 40 are:

1. eat—bread: drink (water, drunk, chew, swallow)
10. tiger—wild: cat (dog, mouse, tame, pig)
20. poison—death: food (eat, bird, life, bad)
30. birth—death: planting (harvest, corn, spring, wheat)
40. advice—command: persuasion (help, aid, urging, compulsion)

### PARTS III AND IV.—GENERALIZATION AND ORGANIZATION

*Test 1. One half of the Pressey moral judgment test*

(12 lines). "In each line cross out the word that does not belong."

Lines 1, 4, 7, and 10 are:

1. borrowing, gambling, overcharging, stealing, begging.
4. stinginess, carefulness, generosity, charity, economy.
7. stupidity, dullness, foolishness, dishonesty, ignorance.
10. meekness, vanity, self-confidence, self-esteem, self-respect.

*Test 2. Twenty selections, each of a member of a class defined by three samples (Thorndike, after Otis)*

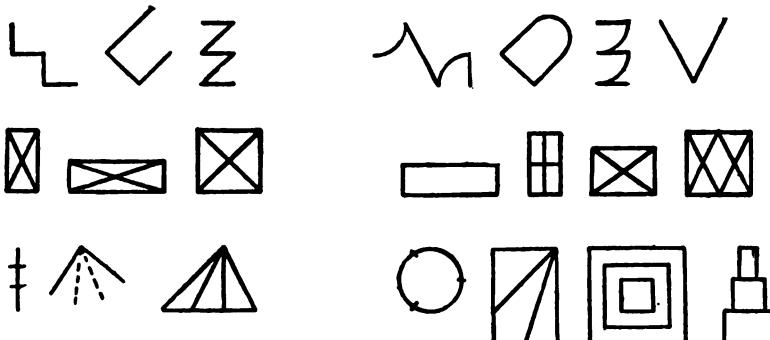
"Look at the words in line 1. Find the way in which the things named by the first three are alike,—the quality or feature which they have in common. Then look at the other four words on line 1, and draw a line under the name of the thing that is most like all the first three,—which has some quality or feature which the first three all have. Do the same for lines 2, 3, 4, 5, etc."

Lines 1, 5, 10, 15, and 20 are:

1. fat	grease	butter	melt	lard	burn	fry
5. clam	scallop	limpet	shell	beach	salt	oyster
10. sapphire	amethyst	ruby	ring	sparkle	topaz	costly
15. football	baseball	golf	chess	tennis	whist	bat
20. north	south	east	compass	wind	turn	up

*Test 3. Ten selections of a member of a class as in Test 2, but with pictures (Thorndike, after Otis)*

Lines 1, 4, and 7 are:



*Test 4. Twelve selections of a member of a class as in Tests 2 and 3, but with numbers (Thorndike, after Otis)*

Lines 1, 4, 7, 10, and 12 are:

21	49	700	800	63	12	94
6/4	15/10	1.5	2/3	2 1/2	3.0	4 2 2/3
25	64	10000	1000	9	640	64025
7	26	63	121	122	123	124
27	125	1000	270	1250	64	10000

*Test 5. Trabue completions J and L (or K and M)*

"Supply the missing words to make each sentence true and sensible. Write only one word in each blank space."

Lines 1, 5, 10, and 15 are:

1. The boy will.....his hand if.....plays with fire.
5. The poor little.....has.....nothing to.....; he is hungry.
10. To.....many things.....ever finishing any of them.....a .....habit.
15. It is.....that a full-grown man should.....a ghost.....he is.....

*Test 6. Cutting a surface so as to produce given surfaces  
(Thorndike, after Army Beta Test 7)*

"Think how you would cut the triangle so as to make the pieces shown in 1. Draw a line or lines to show how you would cut it. Do the same for the triangles in 2, 3, 4, 5, etc."

The test Beta 7 is so well known that we do not reproduce samples of the surfaces and parts here.

*Test 7. Rearranging data to form a true equation.  
(Thorndike) Twenty equations*

"Write the numbers and signs in each line in the proper order, so that they make a true equation as shown in the three sample lines. Use the loose sheets of paper to figure on if you need to."

Sample  
lines

$$\left\{ \begin{array}{l} 3 \ 3 \ 6 = + \qquad \qquad \qquad 3 + 3 = 6 \\ 4 \ 7 \ 8 \ 20 = + \times \qquad \qquad \qquad 7 \times 4 = 20 + 8 \\ 2 \ 3 \ 3 \ 7 \ 18 = + - \times ( ) \qquad \qquad \qquad 7 + 2 = 18 - (3 \times 3) \end{array} \right.$$

Lines 1, 5, 10, 15, and 20 are:

$$\begin{array}{ll} 3 \ 3 \ 4 \ 10 = + - & \\ 3 \ 3 \ 8 \ 48 = + \div & \\ 1 \ 3 \ 4 \ 4 \ 12 = + - \times ( ) & \\ 1 \ 3 \ 3 \ 3 \ 3 \ 21 = + - \times \div ( ) & \\ 2 \ 2 \frac{3}{4} \ 3 \ 4 \ 5 = + \times \times ( ) & \end{array}$$

These tests can be given (a) with so short a time limit for each that very few pupils will finish, or (b) with so generous a time limit that very few pupils will fail to do all of which they are capable, or (c) with the requirement to finish all of each test, the time being recorded for each pupil. The tests are made up in booklets for convenient use by method a. If method b or c is used they should be cut up and used separately.

Convenient times for method a are stated below. These permit the completion of the examination in two periods of 45

minutes plus a practice period of 20 minutes. Any investigator may, however, alter these at his discretion.

**SUGGESTED TIME SCHEDULE FOR METHOD *a***  
*Parts I and II.—Selective and Relational Thinking*

	Minutes
1. Arithmetical problems . . . . .	10
2. Absurdities . . . . .	4
3. Line arrangements . . . . .	4
4. Opposites . . . . .	5
5. Number series completions . . . . .	4
6. Geometrical relations . . . . .	4
7. Mixed verbal relations . . . . .	4
8. Mixed relations (Woodworth-Wells type) . . . . .	4
 Total . . . . .	 39

*Parts III and IV.—Generalization and Organization*

	Minutes
1. Pressey moral judgment . . . . .	2
2. Otis similarities test, words . . . . .	3
3. Otis similarities test, pictures . . . . .	3
4. Otis similarities test, numbers . . . . .	3
5. Trabue completions . . . . .	10
6. Cutting up surfaces . . . . .	3
7. Disarranged equations . . . . .	12
 Total . . . . .	 36

A Practice Form for fore-exercise is provided. It is suggested that the Practice Form be given as follows: Tests A to F inclusive, 1 minute 30 seconds each; Tests G and H, one minute each; and Tests I to N, 1 minute 30 seconds each.

At the end any pupil who did not understand the nature of any task may be given a retrial or special explanations if desired. It is intended that in the regular tests only a few seconds should be spent per test in reading and considering the instructions. However, with pupils in Grades IX to XII, for whom this instrument is especially designed, the use of the Practice Form will almost always be adequate to ensure this.

## THE COLLECTING OF UNRECORDED SPECIFICS

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In an article appearing in *Educational Administration and Supervision*, May, 1918, the writer advocated a method of collecting specific methods of instruction. To this the interested student may refer for the setting of this paper, while the attention of the reader is directed to the technique by which the collecting of unrecorded specifics is accomplished.

It is obvious that there is a great mass of specifics which, though used by expert teachers with excellent results, are found neither in print nor in any other form available for the teacher. That this material is immensely more voluminous than the recorded specifics is clear only to those who have attempted to make the collection. I hazard the estimate that for one recorded specific in meeting any situation there are five which have not appeared either in print or in writing. Used by the teacher as a part of the secrets of her equipment they have not been called for by others except in oral conversation, and, in the absence of a call, the teacher herself has not written them down nor, frequently, is she able to write them. That they are valuable is evident to those who collect; that they have not been collected is inexplicable.

In the collection of unrecorded specifics there are six steps: a difficulty or duty analysis, the turning of this into questions, the training of interviewers, the interview, the report, and the compilation of reports. For the information of the craft I shall describe in some detail the difficulties and methods involved in collecting information concerning the arts of college teaching, retail selling, handling salespeople, teaching ideals, Sunday School teaching, and superintending Sunday Schools. The description will be informal and somewhat in narrative form, because the development of the methods in our laboratories is recent and time sufficient for systematic retrospect has not yet elapsed. The steps will be discussed serially.

### THE DIFFICULTY ANALYSIS

Obviously we may attack the problem of collecting specifics in three ways. We may list the *principles* underlying the methods of an act and collect illustrations of the applications of these principles to specific situations. We may temporarily ignore the principles and make a list of the *duties* or *activities* involved in the performance of the task and collect specific methods of performance. Or, we may merely collect the *difficulties* with which the worker is confronted in performing the activities. For instance, we may list the principles of teaching and collect methods of applying them to specific situations; we may make a job analysis of teaching and collect specifics for performing each duty, or activity; or we may make a difficulty analysis, list those duties with which the teacher has found difficulty, and collect specific methods of performance.

Lack of time does not permit any consideration of the relative merits of these three plans but for sufficient reasons we have begun all our studies with a difficulty analysis. This may be a very simple one. For example, the collector may make a list of the difficulties which he happens to remember, as was done by a group of college instructors who, in a seminar on college teaching, made a partial list of their duties and checked those with which they had difficulty. By such means a composite list of fourteen duties was obtained, which included such subjects as interesting students, grading papers, grading students, learning their names, making them work, teaching them to think, apportioning materials so as to have neither too much nor too little at the end of the hour and the semester, and so forth. Clearly the fourteen points do not constitute a complete difficulty analysis, although they were sufficient for treatment at one time.

A somewhat more complete analysis was attempted in retail selling. Salespeople were interviewed to discover their difficulties, but being neither introspective nor reflective, the bucket was drawn empty from the well. They did not know what their difficulties were. The executives of department stores were appealed to with no better results. So, consequently, a member

of the staff, expert in selling, was delegated to secure an analysis by observation. For three months she spent two hours daily in the stores watching salespeople and listing the difficulties which she observed. By this method of observation some sixty difficulties were obtained, which became the basis for collection.

A still more careful analysis was made of Sunday School teaching. The collector in charge first listed all the difficulties of which she could think, she interviewed friends and added to the list, she visited Sunday Schools and observed the teaching, teachers were interviewed, and state and county executives were questioned. Finally a written request was made for difficulties from fifty members of the Committee on Education of the International Sunday School Association. One very interesting technical result was obtained. It was discovered that in every interview and letter up to a total of thirty, new difficulties were found among the list, but after thirty, no new ones appeared. We therefore felt that in so far as our informants were concerned we had completed the job. Whether a more expert group would have added additional difficulties is another question. From all these sources sixty-seven difficulties were secured.

In a fourth case inferiors were appealed to for a difficulty analysis. This was in connection with the difficulties encountered in handling salespeople. When the expert salespeople were being questioned concerning their methods of handling selling difficulties they were asked to state the difference between a good head of a department and a poor one. The resulting replies revealed the difficulties encountered by heads of departments in handling salespeople from the salesperson's point of view. They reported that the poor head could not be firm without being grouchy, nor kind without being easy, that he was partial, did not know his people's names, reprimanded in public, and so forth. To these were added the opinions of superior executives who were asked the same question. At a later date the question was repeated with some heads of departments themselves. From all these sources thirty difficulties in handling salespeople were obtained.

It will be observed from the foregoing descriptions that a difficulty analysis of any completeness requires considerable time and patience. As a matter of fact, the retail selling analysis required two hours a day for three months and that of the Sunday School teacher took the full time of one person for six weeks, although at the same time the major portion of the analysis of the Sunday School superintendent's job was carried on.

The methods used were those of introspection; interview of the worker on the job, his inferiors, and his superiors; and the method of observation. In no case did the analyst use the useful but cumbersome method of learning the job himself.

#### TRANSLATING DIFFICULTIES INTO QUESTIONS

Since the specifics for handling difficulties are to be obtained by interviews it is necessary to throw them into the form of questions. This presents a number of difficulties, a few of which may be mentioned. The questions must be so phrased as to pull the answer. Two or three illustrations will make this clear. One fault of a poor department head is that, in the store vernacular, "he bawls you out before people." If we ask "How do you keep from 'bawling out' your salespeople before customers?" we shall not get as good material as if we ask, "When you have occasion to reprimand, how do you manage to make the point you desire and at the same time avoid resentment and bitterness?" This question will open up the whole problem of reprimanding and give much better results. Another fault of the weak department head is that "he does not show appreciation of the work of those who try." Here the question finally decided upon took this form. "What are your methods of showing appreciation of the efforts of your salespeople? (a) How do you do this without encouraging egotism?" This sub-question concerning egotism was added to spike the guns of some of the "hard-boiled" heads who maintain that if you praise a salesperson "he will strike you for a raise."

A second difficulty is that of making the shades of meaning too fine. Questions must not be pitched above the level of the

discrimination of interviewers and their subjects. For instance, these two questions are too much alike to produce good results: "How do you show your people that you stand for their best interests in salary and growth?" and "How do you show salespeople that you are personally interested in them?" To the framers of the questions there was a distinction between personal interest and interest in merely salary and growth; but our subjects could not see any and the answers were duplicates. The question "How do you determine when you strike the happy medium between too much sternness and too much familiarity?" was important, but it drew only one answer from thirty informants though the reports covered a total of fifteen typewritten pages. The question might have produced better results if it had been phrased as follows: "What are the signs by which you know that you have struck the happy medium between too much sternness and too much familiarity?"

Since the object of the interviews is to obtain methods, the word "How" or a synonym must be used in every one. In thirty questions on handling salespeople, seventeen use the word *How*.

The correct framing of the questions is so important that we always prepare tentative forms and write them on the board to discuss with the interviewers. The questions are torn to pieces, each man defends his modifications, and a second tentative form is decided upon. They are then tried out in interviews and the replies are brought back and read before the final form is decided upon. It is criminal for an interviewer to spend three hours on an interview and report, if the questions are not efficient.

We have not found it advisable in general to frame such complicated general questions that subordinate questions need to be added to bring out the complete answer. It is a much better practice to break such a question up into a number of separate questions. Extreme care, then, must be taken to frame the questions having the maximum drawing power.

#### TRAINING THE INTERVIEWERS

To interview properly is a task of some difficulty. An interview may run in the following fashion. The interviewer asks

his question. The subject says, "Well, I don't know how I do that, but—" and at once commences to talk. His mind is open to all sorts of reminiscences and he talks on. The interviewer must catch the methods, for somewhere the informant, consciously or unconsciously, is telling *how* he performs the operation and this must be recognized by the interviewer and rapidly recorded in the picturesque language of the subject. As the interviewer listens he sometimes sees that the subject is talking about experiences which do not bear on the question asked. He then has to bring him back to the point with unlacerated feelings. Perhaps he can be brought back; possibly it cannot be done.

This situation demands several qualities in the interviewer. He must be logically minded; if he rambles himself he will not try to keep the informant to the point. He must be rather facile in directing conversation so as to bring the informant back to the point by breaking in with a question in the least objectionable way. He must have polite persistence in digging in with his questions until he has extracted all that he can get. Yet at the same time he must be quick to recognize the point at which he has drained the pitcher. On the mechanical side he should have no inhibitions against writing full reports of what has been said; for in our experience we find that more than half our amateur interviewers write such meagre reports that they are useless. Even after training, out of a group of eleven interviewers who did considerable reporting only four were excellent, four did fairly well and three were impossible. The good interviewer, then, is one who is logical in his thinking, facile in directing conversation, persistent in digging in, and detailed in his writing.

Our methods of training the interviewers are as follows. We first have them help frame and criticize the questions. The purpose of this is to help them to see the function and implications of the questions and to realize that the wording of questions is a subject of importance. They learn that they can vary the question or re-word it on the spot, and thus better draw out what they want. Before the training is completed we have them write up their own answers for, of course, an interviewer to be efficient

needs to know something about the methods, although there is danger in knowing too much. These are written in the form decided upon and are brought to conference and read. As they are read we invariably find that the interviewer supplements what he has written with additional oral remarks. But this is jocularly and firmly prohibited. Interviewers must write everything on paper that they think should be included because the compiler has only the written accounts from which to compile the reports. This is a very important point; everything to be said must be written. As an interviewer reads a report in conference this question is re-iterated by the compiler to the listeners: "Is this reported in sufficient detail for you to follow it?" Usually it is not and suggestions are made concerning points at which elaboration is necessary. This conference is usually an extended one and at its close the interviewers are asked to revise their reports for the next conference. Usually those who have it in them to interview reveal themselves in the revised reports. Then they are sent out to make the first interview with the selected subjects. The first set of these reports is gone over thoroughly in conference in much the same way, as the preliminary reports. Those people who are selected for interviewing are given no further preliminary training; the others are discarded. In training the interviewers, then, a careful weeding-out process is necessary and careful training in the technique is given.

#### THE INTERVIEW

The subjects for the interview are selected because of expert ability. The college instructors who have the best reputations as teachers, the most expert salespeople, the best handlers of men, are located. The methods of selection may vary, but usually we have been compelled to take the opinion of higher executives, who, during long contacts with their subordinates, have come to have a fairly accurate knowledge of the best members of the force. More accurate methods of selection can, of course, be used, although we have not employed them.

When the subject has been selected, he is advised by some one whom he knows that he will be asked to describe his methods, and a set of the questions are given or sent to him. To secure a sympathetic response it is necessary to make the contact quite personal. I may write to a college professor, telling him that I am training young college instructors, and I want to find out how he, with his excellent reputation as a teacher in the college, handles some problems that are bothering these beginners. The president of a firm may gather his selected salespeople together and give them a talk to the effect that, since times are harder, it is necessary for methods of selling to be improved. He points out that even though the salespeople present are excellent salesmen their success is dependent upon the ability of the whole selling force. If customers obtain poor service from incompetent salespeople, they will not return to the store, and the experts will never have a chance to sell to them. They are told that all they have to do is to read the questions over before the interview, think about them, and then talk to a young woman. Particularly is it impressed upon them that *all* they have to do is to *talk*. In any case the idea must be clearly explained to them and their enthusiasm for the project must be enlisted.

It is always advisable to warn the subject beforehand and give him the questions for study. This is important because, even though not one in five study them, the subject has a much better mental set than if the questions come without warning.

It is entirely satisfactory to ask the question directly, as "How can you be kind without being easy?" or "How do you make your students work?" The first response is likely to be negative or non-committal, as "I can't tell you how I do it," or "I have never thought about that," or, "It just comes naturally to me." Then the interviewer should usually say nothing and wait; the subject then feels that he has to say something and so begins to talk. As he talks he tells what he does. He may use incidents or give rules or state his own opinions. But the important thing is to get him to talk freely.

Three rules may be used in directing this catch-as-catch-can conversation. First, ask the question "How do you do that?" at every opportunity. The interviewer wants methods. So when the subject says "I do so and so," the interviewer immediately rejoins "Just how do you do that?" The subject will not descend to details unless he is forced to do so, probably because he feels that, since the method is clear to him, it is self-evident to every body; nor does he yield details easily, because often he may never have attempted to analyze his methods before. Constant repetition of the query *How* is absolutely essential.

Another important request is "Give me an illustration of that." Often the method is revealed more easily by a story than by a tabular exposition. Whether this is the case or not, the illustrations make good reading in the final compilation.

Interviewers must also cultivate the habit of recording what the subject says in the words of the subject. He should take no liberties with the terminology, particularly where the expression is vivid or apt. It is, of course, impossible to quote the subject verbatim, but striking phrases and clever terms must be retained. An excellent interviewer is one whose reports have each an individual style which mirrors the individuality of the subject. Deletion may safely be left to the compiler.

The interviewer must make the subject return to the point when he is wandering far afield. No specific rules can be laid down for this; but no offence is given if the interviewer is tactful, kind, and interested. Such phrases as "I was quite interested in what you said a moment ago about so and so," or "You were about to tell me," etc. A firm but tactful interviewer can complete the conference in much less time than a self-conscious and timid interviewer. But it is much better to err on the side of tolerance than of brusqueness. If both parties are having a good time no offence will be given when the interviewer guides the subject back to the point. The more fun and friendliness one can get into the interview the better.

While the conversation is going on the interviewer gives no offence by writing steadily. He has his note book handy and at

an early point in the interview he may say, "Wait—I want to get that down." This naturally pleases the subject, who continues to talk with more animation, because of the evident importance of what he is saying. I have had a subject try to help me by attempting to re-state his own vivid account in the platitudinous epigrammatic form he had read in books on salesmanship.

The interviewer must not be encumbered by too many subordinate questions worked out in advance. If he is to get information upon specific minor points he may do so. But the success of an interview lies in the persistence of the interviewer in boring in with questions to get methods and in the informality of the conversation. If he has a stereotyped method of attack and does not follow the current of the conversation, the subject will not talk freely.

The interest of the subject, when proper contacts have been made, can always be counted upon, so far as our experience goes. We feared that the salespeople would look upon their methods as trade secrets by which they had achieved success and would not wish to reveal them. But on no occasion has any subject been unwilling to talk freely in our interviews, although we have interviewed over five hundred persons this year. Sometimes if the interviewer arrived at a very busy moment the subject may have been hurried, but was never discourteous. The reason is that all men love to be questioned by an interested listener about the things which they know best.

Certain limits as to time and the number of questions have been observed. Though our longest interview was five hours, at the end of which time the subject, a college professor, was still going strong and the interviewer, a young instructor, was a physical wreck—the average length of interview with the professors was an hour and a half. With the salespeople the interviews last for an average of forty-five minutes. The length must be pitched to the interest and endurance of the subject. If it is too long the last questions will be hurriedly answered. Indeed, we have found it advisable to have the interviewers change the order of the questions to obviate this difficulty. Likewise,

we have had to caution them to speed up the interview upon the early questions in order to leave sufficient time for discussion of the later ones.

When more than seven questions are included in an interview there must be a good reason for the extra number. Occasionally more have been asked by us but careful inquiry from the interviewers has led us to place seven as a reasonable number for one interview.

We have demonstrated to our own satisfaction that the interview is superior to the written questionnaire. On one occasion we had sixty subjects write answers to seven questions and later we interviewed them. The written replies brought us fifteen methods of handling the seven questions. The interviews, however, extracted eleven methods in answer to one question and forty-seven for the seven questions.

The explanation of this lies in two facts. First, subjects as a rule do not write as freely as they talk, and will not willingly write anything more than the minimum. In the second place, they write their philosophy of life or some other vague generalities and will not get down to specific details. When they talk to an interviewer he can bore into the realm of their rich experience by asking "How?" and "For instance—"; but when they write there is no recourse. Their statements cannot be easily supplemented.

On two occasions recently we have had recourse to written reports. In one case two hundred teachers of Pittsburgh were asked to state how they taught courtesy. To obtain details they were asked to write at least five hundred words, and this device gave that volume which is conducive to the statement of detail. In this case it was impossible to interview any large numbers, and the results were valuable but the labor for the compiler was huge. Not over thirty percent of the material was to the point, and I am of the opinion that if we had had five interviews with subjects in each grade, or a total of forty, we would have obtained better results. On the other occasion we divided sixty-seven questions concerning the difficulties of Sunday School teaching

among twelve hundred picked Sunday School teachers in the northern states with the purpose of having each answered by one hundred and twenty teachers. In this case we took elaborate care to simplify the work and particularly in the directions gave an example of how to answer one question incorrectly as well as correctly. This device proved to be very useful and the results were unusually good for the written questionnaire. It may be stated parenthetically, however, that in asking 120 teachers to answer each question we hoped to obtain thirty answers. In other words we hoped to obtain returns from twenty-five percent and as a matter of record we received twenty percent.

This leads to the question of the minimum number of subjects to interview on any question. Upon this we have definite figures. Our maximum number of interviews on any question is 117, excluding the two written questionnaires. Our minimum number was thirty. In the handling of salespeople we averaged 77 on each question. This study consisted of twenty-three questions and the total number of specifics obtained was 136. Of these 136, ninety-seven percent were obtained in the first thirty answers to each question.

The only advantages that accrue from more than thirty interviews are the addition of this small percentage of specifics and the variety of expression and illustration which may often add force to the compilation, especially when it is directed to a semi-popular audience. We have ceased trying to obtain more than fifty reports on a question and are reasonably well satisfied if we obtain thirty.

#### THE REPORT

As soon as the interviewer has completed his interview, or not later than the same evening, the interviewer is expected to write up his report before the details have evaporated. It takes about as long to write the report as to hold the interview. So in the assignment of interviews we have adopted the plan of allowing about three hours for each interview and report, which is a minimum, after considering the amount of time spent in arranging and waiting for the interview. It has already been

stated that the report must contain sufficient details to be used by another person. All irrelevant material must be excluded. Preferably the specifics given should be numbered, both for ease of compilation and for clarity of description; but this cannot always be rigidly adhered to without the loss of the vividness of a subject's description.

On the mechanical side the observance of a number of details helps in the final compilation. We have followed the plan of writing the reports on paper of uniform size.

Certain facts are useful to the compiler. The interpretation of the report may be clarified by knowing who gave it and the angle from which it was given. The interviewer's name serves as a check; and the time consumed is useful for time studies. A code number is placed on the report for each question and refers us to the first page. Each question is answered upon one or more separate sheets of paper so that they can be distributed later. The sheets for one interview are clipped together and handed in.

It is important with amateur interviewers for the compiler to read the reports to them as they come in so that he can train them to improve upon their interviews or reports. To demonstrate to an interviewer that his report reveals little or nothing of method is salutary. He may defend himself by saying that he could get nothing from the subject; and although this is occasionally true, he is placed upon the defensive and is in proper condition to accept coaching from the compiler. Some of the interviewers soon need no checking and others have to be dismissed.

#### THE COMPILATION

When the required number of reports have been obtained they are naturally separated and the thirty or forty answers to each question are brought together. I have found the following method of compiling the least burdensome.

I place the reports on one question before me and as I read I notice each specific. For instance, in the seventy-seven reports upon the question, "How do you secure the confidence of your salespeople?" I find the following methods:

- I. Raise salaries as soon as deserved
- II. Give opportunity for a fair hearing
- III. Keep promises
- IV. Assist them to better themselves
- V. Treat them with respect
- VI. Give praise fully when it is deserved

These were obtained by reading the reports. When the first report was read Numbers I and II were found and jotted down on a finding list; in the second report Numbers I and III were found; and Number III was added to the other two on the finding list. In each report the Roman number which stands for the classification is placed in the left hand marginal space and lines drawn to indicate where it begins and ends. All irrelevant material is crossed out. A stenographer then takes the reports and copies all the statements with the Roman numeral attached, in a running account without regard to order. These are then cut and collected so that when the report comes to the compiler's desk he has all the methods reported in answer to the major question classified and arranged.

From this point on the organization of the material is determined by the form of the final material which the compiler desires. It becomes his business to provide the connective tissue and throw it into final form. The interesting problems of organization and interpretation of arrangement around central principles in syllabus or expository form cannot be discussed here.

In conclusion, a few qualifying remarks should be made about the method. In the first place, specifics so collected are not evaluated. Some may be good and some bad. It may be said, however, that when experts only are interviewed the probability of usefulness is high, and in any case the methods are offered as a variety of suggestions rather than as a collection of scientifically evaluated methods. Moreover, I know of no basis of equal value for a long campaign of evaluation. Nothing is more favorable for such a purpose than this varied and voluminous body of specifics, which may be tried out under controlled conditions and given their proper value. Such methods do not

supersede scientifically evaluated methods, but they fill a gap in which there are no recorded methods.

Neither can we assert that these reports minutely describe actual practice. One subject phrased it excellently when he asked, "Do you want to know what I do or what I ought to do?" But if a body of experts will tell us what they ought to do, their wisdom is more suggestive than is a description of what they actually do when they are tired or hurried. Their best judgment about the best thing to do is very close to maximum excellence.

If so much time had not already been consumed I should be glad to discuss other limitations of the method and the results, because many of them are quite apparent to me; but my main purpose has been to describe this method in some detail.

On the positive side it is entirely clear to me that trained interviewers can be utilized today in any fairly large school system to collect from the teachers a more voluminous, a more suggestive, and a more practical body of specifics used in the control of any difficulty than is found in print, and with the exception of recorded methods which have been scientifically derived and evaluated, they are likely to be superior. Any such school system has enough methods going to waste, so far as their general use is concerned, to provide the teaching force with all the methods needed to run the schools with maximum efficiency.

The method need not be confined in the schools to the collecting of specifics for teaching difficulties. Job analyses of the supervisors' duties, as well as of those of the principal, the city superintendent, the county superintendent, the vocational adviser, and the janitor can be made, and by widening the scope of the survey equally valuable masses of specifics can be collected and compiled. But the interviewers must be trained, the task must be seriously and skillfully performed, and the necessary patience and assistance assured.

## THE RELATIVE PROGRESS OF VII-B GROUPS SECTIONED ON THE BASIS OF ABILITY

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This report gives some achievements of different VII-B ability groups in the Cleveland schools. These pupils had been given the Illinois intelligence test as VI-A's early in January, 1920. The results were utilized by the junior high school principals in arranging them into VII-B groups of different ability as they entered the junior high school on January 31st. In some cases weight was given to previous school records. Administrative necessities entered to some extent.

In presenting the results, we are not unmindful of the fact that success in school work depends not only upon intelligence but upon several other factors, among them being general maturity, previous scholarship, effort, home environment, attendance and health, the quality of teaching, and the course of study. Naturally, a pupil who is highly favored in each of these respects will advance more rapidly than one who is unfortunate in each.

At the end of the semester in June, an effort was made to determine some of the achievements of the different sections in each school. The pupils were tested with the Stone Reasoning test in arithmetic; the Monroe Reading Test, Form II; and the Charters Language Test. Statements of the quality of work done by the different sections were obtained from the teachers.

### STANDARD TEST RESULTS

After the results of the tests had been tabulated by classes, the records were arranged according to the class intelligence score. All classes with an intelligence score of 82 and up were placed in Group I, between 72 and 82 in Group II, between 67 and 72 in Group III, between 62 and 67 in Group IV, between 52 and 62 in Group V, and below 52 in Group VI. The number of classes in the different groups ranged from nine to fifteen.

The score made by the median class in each test and in each group was next determined. This record appears in Table I. In arithmetic, the median class in the lowest intelligence group

TABLE I.—MEDIAN CLASS SCORES BY INTELLIGENCE GROUPS

ILLINOIS INTELL- IGENCE TEST SCORE	MEDIAN INTELL- IGENCE SCORE	MEDIAN AGE	STONE ARITH- METIC	MONROE READING		CHARTERS LANGUAGE
				Compre- hension	Rate	
82 & up...	86	12.7	7.0 (12)*	32.3 (11)	133 (10)	21.1 (12)
72-82.....	75	12.8	6.6 (18)	26.8 (13)	133 (10)	18.8 (12)
67-72.....	69	13.1	6.1 (9)	23.8 (8)	133 (7)	16.7 (8)
62-67.....	65	13.2	5.1 (15)	23.6 (12)	115 (9)	15.8 (12)
52-62.....	56	13.3	5.1 (15)	21.5 (12)	115 (8)	14.0 (14)
Below 52...	48	13.7	4.6 (10)	18.0 (9)	101 (8)	13.8 (10)

\*Figures in parentheses indicate number of classes represented.

scored 4.6 while the median class in the brightest group scored 7.0, a *difference equivalent approximately to one and one half year's progress*. In reading, the median class of the lowest intelligence group scored 18.0 in comprehension and 101 in rate in contrast to 32.3 and 133 respectively for the median class of the brightest group of classes, a *difference equivalent to more than two years of work*. In language, the scores made by the median classes were 13.8 for the lowest and 21.1 for the brightest intelligence group, a difference again equivalent to more than two years of progress. Thus we see that the average class of highest intelligence was in no case less than three semesters ahead of the average class in the lowest intelligence group.

Space does not permit us to show the individual record of each class in each of the fourteen schools. As a rule, the sections that made higher intelligence test scores in each school excelled in scholarship. In the arithmetic test, 22 of the best 37 classes and only 7 of the poorest 37 made a score of 6.0 or better. In reading comprehension, 65 classes were tested. Among the best 32, there were 22, and among the poorest 33, there were 4 that equalled or exceeded Monroe's comprehension standard of 26. Out of the 34 best classes tested in language, there were 25 that scored 18.0 or better, while out of the poorest 34, there were

only 5 that scored 18.0 or higher. The classes that made a score of 6.0 or better in arithmetic were three times as frequent in the better half as they were in the poorer half. Those that made a score of 26 or better in reading were five and one half times as frequent, and those that scored 18.0 or higher in language were five times as frequent as in the poorer half.

The brighter sections were generally made up of younger children. The typical class among the brighter half of the classes was slightly more than half a year younger than the typical class of the poorer half. The age of the former was 12.8 years and of the latter 13.4 years. The classes in the group having an intelligence score above 82 were one year younger than those in the group with a score below 52. The age of the "82 and up" classes, as may be seen in Table I, was 12.7 and that of the "below 52" classes was 13.7. The former were not only mentally more mature as shown by their higher intelligence score, but possessed a higher intelligence quotient as may be seen by comparing the ratios of their ages and intelligence score. The intelligence score of the median class in the former was 86 and its age was 12.7 years while the latter had an intelligence score of 48 with an average age of 13.7 years.

To determine just how closely the results paralleled intelligence for individual pupils, the records of 200 pupils, selected at random, were correlated with intelligence by employing a formula (Pearson) commonly used in statistics. The results in every case were positive. The highest correlation between intelligence and any of the school subjects was found in arithmetic. Reading (comprehension) ranked second, and language third. The figures were .50, .44, and .37 respectively where 1.00 represents perfect correlation. For pupils of the same school grades, these figures are considered as representing a fair degree of correlation. It is altogether likely that the correlation between intelligence and results would be materially higher if the results of several intelligence tests, rather than a single test, had been used. When we reach the point where the schools succeed in getting out of every pupil all that they should, in view of his

intelligence, and when we are absolutely certain that we have measured his intelligence correctly, we may expect these figures to go much higher.

Grouping by intelligence or mental maturity does not eliminate the necessity of good teaching to bring out the best results. *Equal or approximately equal intelligence does not mean equal scholarship.* While the results in different sections of the same school correlated fairly closely with intelligence scores, two facts stand out quite prominently. (1) There was a marked difference between classes of the same intelligence. (2) Some low intelligence classes did better than others of high intelligence. How great the difference between the best and poorest classes in each intelligence group and subject were may be seen from Tables II-IV.

TABLE II.—THE BEST AND THE POOREST CLASS SCORES IN THE STONE ARITHMETIC TEST FOR EACH INTELLIGENCE GROUP

INTELLIGENCE GROUP	82 UP		72-82		67-72		62-67		52-62		BELOW 52		
	Best	Poor-est	Best	Poor-est									
INTELLIGENCE SCORE.....	99		82.4	78.4	75.8	70	68	62	64.5	59.8	56.3	44.5	42.5
ARITHMETIC SCORE.....	88												
MEDIAN ARITHMETIC SCORE OF GROUP.....	8.0*	5.1	8.6	4.9	6.9	4.6	7.3	4.0	6.3	3.1	6.1	3.0	
			7.0		6.6		6.1		5.1		5.1		4.6

\*Two classes in the highest intelligence group made equal scores

In the Stone Arithmetic Test, 1.5 points represents approximately one year's growth. The average difference between the best and poorest classes in each intelligence group is slightly more than 3.0, or approximately *the equivalent of two years of progress.* The differences in the Charters Language Test where a difference of 3.0 points represents somewhat more than one year's growth were equally pronounced. In reading comprehension, the best class in every intelligence group, save the low-

est, scored above Monroe's eighth grade comprehension standard of 28.2. The poorest class in all but the two brightest groups fell below his sixth grade standard of 18.1. When such variations are found between classes supposedly differing very little in intelligence, the cause of the difference must be sought in

TABLE III.—THE BEST AND POOREST CLASS SCORES IN THE CHARTERS LANGUAGE TEST FOR EACH INTELLIGENCE GROUP

INTELLIGENCE GROUP	82 UP		72-82		67-72		62-67		52-62		BELOW 52	
	Best	Poor-est	Best	Poor-est								
INTELLIGENCE SCORE.....	82.4	84.5	79.5	73.6	70.8	68.5	65.8	62.5	56.3	55.5	48.3	48.8
LANGUAGE SCORE.....	26.7	17.8	23.0	13.8	21.8	15.0	22.8	10.5	20.2	9.0	19.7	9.5
MEDIAN LANGUAGE SCORE OF GROUP.....	21.1		18.8		16.7		15.8		14.0		13.8	

something other than intelligence. The differences are undoubtedly due in the main to differences in educational environment, the chief factor in which is teaching.

In passing it should be observed that foreign parentage and the consequent language handicaps may have entered into the

TABLE IV.—THE BEST AND THE POOREST CLASS SCORES IN MONROE READING COMPREHENSION FOR EACH INTELLIGENCE GROUP

INTELLIGENCE GROUP	82 UP		72-82		67-72		62-67		52-62		BELOW 52	
	Best	Poor-est	Best	Poor-est								
INTELLIGENCE SCORE.....	85.5	88.0	76.5	78.3	70.8	68.5	65.8	63.0	56.3	54.0	50.9	44.5
READING SCORE.....	37.0	28.3	32.1	20.8	29.0	17.5	32.8	16.0	30.0	15.0	22.5	13.6
MEDIAN READING SCORE OF GROUP.....	32.3		26.8		23.8		23.6		21.5		18.0	

results of our tests to some extent. In one school, for example, only 23 percent, and in another, 26 percent of the pupils were of native white parentage, as against 63 percent and 62 percent in two other schools.

A distinct need, brought out by the disparity of results among classes of approximately the same level of intelligence and by the superior achievements of some of the classes of lower intelligence over those of much better intelligence, is that of closer supervision of the teaching product. One may well ask whether teachers are making good use of the pupils' time and of their own when such inferior results as those of the poorer classes are obtained. It is clear that some classes are not securing the results they should, in view of their natural gifts. The fact that the best class in the lowest intelligence group in arithmetic and language exceeded the record of the poorest class in the highest group shows that it is possible even without unusual effort to reach a much higher standard than that attained by the poorer classes in every group. Much improvement could, undoubtedly, be brought about through helpful supervision. We have already invested our money to the extent of providing buildings, equipment and teachers, and in return secure some such results as those indicated in the preceding tables. Would it not, therefore, be a good investment to spend a few additional dollars to train these teachers to make accurate diagnoses of results, to select the most appropriate materials and methods and to develop adequate skill in their application? If our statement of the principal cause of difference between classes of the same intelligence is at all accurate, namely, a difference in the quality of the teaching, then most assuredly it would.

If classes of given intelligence levels are to work to their own best advantage, there must eventually be courses of study suited to the abilities of different groups. Brighter groups may be expected to delve deeper into a subject while more extensive eliminations of non-essential subject matter are made for the lower groups. Thus far, comparatively little, so far as we know, has been accomplished in this particular direction. It is to be hoped

that differentiated courses of this nature will be developed within the next few years. Possibly the day may come when we shall have text books addressed to children of given degrees of intelligence. Instead of continuing to bend the child to the course of study and the text book, we must reverse the process.

Another important suggestion arising from the results is the need of achievement standards for classes of different intelligence levels. So long as we have one standard for all children of a grade, we are apt to expect what is next to impossible from one group of children and what may be had with the barest semblance of effort from another. Moreover, the teacher of the low intelligence group will probably be regarded as a failure while the teacher of the bright group will be heralded as a success.

However, as present standards go, we need have little fear for the low intelligence groups, so long as they have good teaching. The standards of most tests are probably within the reach of all but the near-feeble-minded or definitely defective children. It is high time that we were getting beyond standards based upon average performance, and presumably average intelligence. To continue to accept them is to be content with mediocrity. Standards should represent the results which good teaching can accomplish with a given grade of intelligence and mental maturity. In this connection, we may question whether the recent attempts to set up accomplishment or achievement quotients<sup>1</sup> are not likely to mislead, however praiseworthy these efforts are. By the methods proposed by Buckingham and Monroe and by Franzen,<sup>2</sup> the achievement of a child who does as well as the average of children for his age and intelligence is regarded as 100 percent achievement or 1.00, that is, normal. While they recognize of course that many children can accomplish more, they wish us to subscribe to a policy of calling the product of a variety of conditions good, bad, and indifferent, 100 percent attainment. To do this is conducive to mediocrity, for it requires only mediocre

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<sup>1</sup> Buckingham, B. R., and Monroe, W. S., *Illinois Intelligence Examination, Teachers Handbook*.

<sup>2</sup> Franzen, R. H., *The Accomplishment Quotient, Teachers College Record*, 21:432-40, November, 1920.

teaching and the same quality of effort, with fair attendance on the part of pupils, to achieve such standards. What will be the effect of allowing teachers and pupils to feel that their accomplishment represents 100 percent when, as a matter of fact, they could easily do more? The scores made by the best classes in Tables II, III, and IV were not obtained under conditions that were at all unreasonable. They were not even so unusual as to attract the attention of the supervisory staff. Yet by the methods proposed these children would, undoubtedly, be regarded as having achieved considerably more than 100 percent. It would be far better to regard the achievement of the best classes of any intelligence level as 100 percent attainment, but even that would not be satisfactory. When our science of measurement advances to the point where it will enable us to measure the capacity of children of given intelligence levels for learning specific subjects, such as arithmetic or reading, it is possible we shall want to regard achievement in terms of *capacity to achieve*. Few children would ever attain 100 percent achievement, but we would know how far the child had progressed in the direction of his possibility to achieve.

#### STATEMENTS OF TEACHERS

Statements of teachers, as may be seen below, indicate almost uniformly that the stronger sections were able to do either a much higher quality of work or more work than the weaker sections. Pupils were enabled to work with others capable of going at about the same pace. Dull children were not carried beyond their depth, nor bright children permitted to loiter.

#### TYPICAL COMMENTS ON THE WORK OF DIFFERENT SECTIONS

1. Mathematics. "In these sections (Slow), we omit the more difficult part of the assignment, and give the work more slowly. We take more time for explanation, give more drill work, board work and much oral concrete work. We give much attention to analysis. We find in the more advanced classes the pupils have more initiative and can work more independently."

## Better Sections

2. English.

- (1) "Cover assignment easily and contribute more to each recitation."
- (2) "Enjoy work and like to solve problems."
- (3) "Have deeper appreciation; can handle more difficult selections."
- (4) "Have time for and enjoyment of dramatics."
- (5) "Content (of composition) is richer, form only average."

3. Art. "The same work can be given Groups IV and V (slow sections). They require continual supervision. In the Groups I and II (bright sections) directions are carried out without supervision." . . . . . Cooking. "It is necessary to repeat work until it becomes automatic in the V's while the I's and II's advance more rapidly.

4. Mathematics. "While we have attempted to give our VII-B's in mathematics the same general assignment, the *quality and quantity of work* done in our I and II divisions (strong) is vastly superior to that done in the V division (slow), care having been exercised to make the daily assignments suited to the ability and intelligence of respective classes.

5. Music. "As a rule the children who do the best work in other subjects do the best work in music. Especially is this true in part singing. The slow pupils can sing a one part song equally as well as the brighter ones, but in a two or three part song, it is difficult for the separate groups to carry their parts."

6. History. "Since Group I met only four times a week it was impossible to go more fully into the work than in the III and IV (weak) divisions." . . . "In Group II the assignment was covered more fully than in the other sections. It was possible to spend more time on the study of the colonies (and to study more colonies) and on the great characters of the colonial period. More supplementary reading was possible . . ." "In Group V the assignment was not covered as fully as in the other sections."

7. Geography. "The qualities (initiative, originality, leadership, power of concentration, ability to apply geographical principles, and interest in subject matter) are present more uniformly in sections I and II than in sections III, IV, V, and VI."

## Slower Sections

- (1) "Cover only a minimum assignment, and contribute very little."
- (2) "Enjoy only the simplest types of work."
- (3) "Meager appreciation; must have only the simplest selections."
- (4) "Time insufficient and ability lacking for dramatics."
- (5) "Content mediocre, form often good."

"The following assignment was given to sections I and II:—  
Locate in plateau regions various industries. Establish hydro-electric power plants. Select sites for irrigation projects, also for sanatorium resorts. Give reason for choice of location of industry in that region. (Here follows a list of the industries selected by the children. "With the aid of maps and references, each pupil went to work with a will and keen desire to prove the claim to the 'financial aid' which the teacher promised to extend if the industry could be put on a paying basis. In sections IV, V, and VI, the method of procedure was very different. The class read from the text book and supplementary material, constant reference was made to wall maps with questions by teacher and pupils. This was necessary to hold the pupils' interest and keep them 'on the job.' In divisions I and II, the teacher's work is in the background, while in the others the teacher must supply more leadership and initiative."

8. English. In composition, the VII-B<sub>3</sub> Section III (strong) prepared more difficult topics and worked with fewer notes, with emphasis on presentation as well as the subject matter." . . . In literature, "the III class discussed less obvious points in the stories, looked up allusions, etc." . . . In grammar, "Group VI covered the essentials, chiefly, such as subjects, predicates, and parts of speech. Group III went into the modifiers, (adjectives, adverbs, etc.), used more difficult sentences and more involved examples."

#### CONCLUSIONS

The results afford sufficient justification for the policy of grouping pupils on the basis of ability. However, in the future it will probably prove advisable to take into account in addition to intelligence, previous scholarship, standard educational test records, and any other unusual conditions.

The next problem will be to take adequate care of the different groups. Whenever the pupils of a bright group are physically and socially mature enough, they should be permitted to pass through the school system in less time. In a city like Cleveland, each class of 25 that can be made to cover the work of the three-year junior high school period in five semesters will result in a saving to the district of not less than \$1500. One such class annually in each of its 17 junior high schools would effect a yearly saving of \$25,500, to say nothing of the additional classroom space made available.

For the groups that will not skip, varied courses of study need to be provided. The better-than-average classes need an enriched content, while the classes of lower-than-average ability need a minimum essentials course.

Achievement standards for groups of various intelligence levels are needed. These should be based upon the possible attainments of well-taught children of given degrees of intelligence and mental maturity. Present standards are far too low, especially for brighter groups of children. Pupils should be brought to the point where their rates and amounts of learning accord approximately with their intelligence.

The situation could be improved by means of a greater amount of helpful supervision. This is probably one of the most important tasks confronting principals. Since principals cannot often give the necessary attention to the detailed analysis of results that is required, it will probably prove economical to designate some one person in each building to devote a portion of his time to assisting the principal for this purpose. Such an individual could assume responsibility for retesting pupils from time to time, so that more dependable measures of each child's abilities might be had. He could confer with teachers regarding classes or individuals whose ability and school work were not in accord and could assist the teacher in finding the necessary remedies. By so doing, many pupils would, undoubtedly, be saved from failure, thereby resulting in saving the school district additional sums. A comparatively small number of pupils prevented from failing would much more than pay for the cost of the portion of the person's time devoted to this type of work. Not only should such an assistant serve to prevent many failures but should bring about improvement in the quality of instruction.

## THE "LIST" VERSUS THE "SENTENCE" METHOD OF TEACHING SPELLING

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This study has been made in an attempt to determine the relative superiority of the list method and the context method of teaching spelling. In order to make the results as true to actual conditions as possible, the study was carried on with as little modification of normal procedure in the class room as practicable.

The study was made in two Rochester, New York, schools, Seward School Number 19 and Francis Parker School Number 23. The children of both schools are from good English-speaking homes. Exactly 1100 pupils taught by thirty-two teachers were used for the experiment. The grades ranged from the third to the eighth, inclusive, and the ages of the children from seven to fifteen.

### THE METHOD

The regular text for each grade was selected because it was found to furnish a sufficient amount of suitable material for the test, and because it would permit the regular program of the school to progress under as nearly normal conditions as possible.

The organization of both schools was combined and to each grade the particular method of teaching to be followed was assigned. For example, Grade VIII-A in School Number 23 used the context method, while Grade VIII-A of Number 19 used the list method. Grades VIII-B and another class of Grade VIII-A in School Number 23 used the list method, Grade VIII-B in School Number 19 used the context method, etc., down through the entire list. This, as will be seen, gave a variety of methods in each grade.

The experiment lasted over a period of thirty lessons and at the end of each ten lessons a test was given. To determine the initial spelling ability of the children a test of twenty-five words was given in each grade at the beginning of the experiment,

except in the third grade where ten words were used. This first series of tests was prepared by the principals of the two schools concerned, a separate test being made for each grade. The words were selected from the regular spelling list to be learned during the year. This test was first presented in context form, the teacher giving the test words in sentences and the children writing the complete sentences as dictated. No emphasis was given to the test words in these sentences. Then the words to be tested were pronounced in list and written on another paper.

The first test was designed to determine roughly the initial spelling ability of each child. The second and third lists were prepared from words in the ten preceding lessons and presented in the same manner as the first, except that their purpose was to test the degree of attention that had been developed by each method of instruction during the past ten lessons. The second and third tests were prepared for each section of each grade. The fourth test resembled the second and third except that its range comprised all the list taught during the thirty lessons. This test was designed to determine whether or not better word imagery of a lasting character was secured by the one method of instruction than by the other.

For the purpose of this experiment the time expended in spelling instruction by either method was the regular amount allowed by the Rochester schedule of fifteen minutes per day in all grades except the third where twenty minutes were allowed. By fifteen minutes to spelling instruction is meant that from the time the lesson began until the papers were finished by the children only fifteen minutes were to be used.

The method suggested for general use in teaching spelling was the Pearson method with such modifications as seemed best adapted to contextual or list instruction.

The experiment was begun fairly early in the semester. In order to have words that had not been taught, a portion of the text toward the end of the assignment for the term was selected for each grade. The teachers were instructed concerning the time allotment and method, and advised not to progress under

any circumstances faster than an arbitrarily determined rate of six new words per day.

One group of teachers tested each day's results by having the words written in lists and an equal group tested results by having the words written in sentences.

Tables I, II, and III show the results. It will be seen that according to Table I the children of the third grade who were to be taught by the list method numbered 81, and that they averaged 77.7 percent when tested the first time by the list method and 69.2 percent when tested by the sentence method on the same words none of which had previously been studied. At the same time 56 third-grade pupils, who were to be taught by the context method, earned 62.3 percent on the list test and 55 percent on the sentence test.

In all cases children are shown to spell better in list than in sentences. This is no more true of those who were taught by list than of those who were taught each day to write the words in sentences. In the final test the third-grade pupils who had been taught to spell in lists earned 2.2 percent less on the "sentence test" than on the "list test"; while the corresponding loss of those who had been writing sentences daily was 4.7 percent. In the fifth and sixth grades (Table II), those who were taught by the list method lost 3.1 percent when their sentence spelling is compared with their list spelling; while the pupils of the same grades who were taught to spell in sentences lost 1.0 percent.

In Grades IV to VIII inclusive the loss of the "list taught" spellers was 1.3 percent and those taught in sentences likewise

TABLE I.—RESULTS OF TEACHING WORDS BY THE LIST AND CONTEXT METHODS. THIRD GRADE

	TEST I		TEST IV	
	List form	Context form	List form	Context form
<b>TAUGHT BY LIST</b>				
Number of pupils.....	81	81	82	87
Percent correct.....	77.7	69.2	88.7	86.5
<b>TAUGHT BY CONTEXT</b>				
Number of pupils.....	56	56	57	57
Percent correct.....	62.3	55.0	88.1	83.4

TABLE II.—RESULTS OF TEACHING WORDS BY LIST AND CONTEXT METHODS. FIFTH AND SIXTH GRADES

	TEST I		TEST IV	
	List form	Context form	List form	Context form
<b>TAUGHT BY LIST</b>				
Number of pupils.....	202	201	203	205
Percent correct.....	59.6	55.6	89.9	86.8
<b>TAUGHT BY CONTEXT</b>				
Number of pupils.....	165	166	171	171
Percent correct.....	63.5	59.2	89.8	88.8

TABLE III.—RESULTS OF TEACHING WORDS BY THE LIST AND CONTEXT METHODS. FOURTH TO EIGHTH GRADES INCLUSIVE

	TEST I		TEST IV	
	List form	Context form	List form	Context form
<b>TAUGHT BY LIST</b>				
Number of pupils.....	412	412	418	420
Percent correct.....	68.4	65.	90.5	89.2
<b>TAUGHT BY CONTEXT</b>				
Number of pupils.....	458	457	456	456
Percent correct.....	70.8	65.8	89.7	88.4

lost 1.3 percent. *It appears then to be true that in general the loss in spelling ability which results when pupils write in context cannot be prevented any more effectively by using a sentence method than it can by using the list method.* By comparing results of the first set of tests with those of the fourth test it is seen that the loss in context spelling over list spelling is greater in the case of unfamiliar words than it is in case of familiar words.

#### CONCLUSIONS

The chief conclusion to be drawn from the above tabulations is that there is no advantage in having children write their spelling words in sentences. Pupils using the list method did better than those using the sentence method. In Grades IV to VIII, the 458 pupils who were to be taught by the sentence method were shown to be slightly better spellers at the beginning of the experiment than were the 412 pupils who were to be taught by the list method. At the end of the teaching period, however,

the list-taught pupils made slightly the better scores. In the third grades, the list-taught pupils started with a very decided advantage and ended with a reduced but a very distinct advantage. In the fourth grade, list-taught pupils started and ended with distinct advantages over the sentence-taught pupils. In the fifth and sixth grades the list-taught pupils started with a distinct disadvantage and ended with a slight disadvantage. In the seventh and eighth grades there appears to be little advantage to either group.

It is evident then that if teachers are to have words written into sentences they must see values in that procedure, other than spelling values. If teachers wish to test pupils on the new words of the week, as is advocated by the best authorities, and if they desire to have the spelling work reviewed within the allotted spelling time, they will use the list method. That they will be justified in so doing is suggested by the results of this experiment.

## AN AID TO THE ANALYSIS OF VOCATIONAL INTERESTS

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Three year's trial has demonstrated the service of a blank for training pupils to analyze their work interests. Pupils are often left to flounder under the injunction: "Think what vocation you desire to enter." The blank to be described was developed to meet this situation. It was first tried out with 8,500 pupils in all the Pittsburgh high schools, where it was given as a group exercise in all the forenoon classes. The vitality of the method is attested by the fact that four of the larger schools continued to use it with all new pupils. The method was informally mentioned at the meeting of the National Vocational Guidance Association in 1920. Numerous inquiries followed and several school systems, notably those of Erie, Pennsylvania, and Seattle, Washington, have used the plan. The Y. M. C. A. and other organizations offering vocational guidance in New York and Chicago have also utilized portions or all of the blank. A summary of the 1918 results in Pittsburgh with an exposition of its main feature is here presented to encourage further trial of the method.

The plan differs from other self-analysis blanks in being devoted entirely to the problem of relating the vocational choice to fundamental personal interests. Moreover, the purpose was to show a young person of high-school ability *how* to observe his aptitudes, *how* to discover his special vocational tendencies, and *how* to think about his work interests. It is a blank for training in observation of personal interests so that from a mass of vague impulses the special vocational direction may become better defined. The objection that such analysis is too difficult for high-school pupils was definitely settled by the Pittsburgh experiment. The blanks were filled out by all classes in each school during the forenoon recitation periods, without consulta-

tion or discussion and without leaving the room. This plan of filling out the blank is not advocated as generally wise, but it was used this first time to determine whether the blank could be answered by all classes in high school. It was found that four out of five answered the complete blank so adequately that the data could be compiled. For none was it too difficult to attempt. Instead of giving the blank as a group exercise, several schools now ask the pupil to take it home and talk it over with his parents. In this way the parents also become interested. In either case the blank becomes the basis for individual interviews with vocational counselors.

The blank consists of ten parts printed as a folded sheet of four letter-size pages. Samples may be obtained from the writer upon request. For the purposes of the present paper certain features will be described in detail. The subdivisions consist of: (1) record of occupation of the father and of other relatives or friends whose work has interested the pupil; (2) the occupations in which the pupil has worked, with the features liked and disliked; (3) a list of subjects studied to be checked for those preferred; (4) a list of paired contrasting work conditions to be checked for those which appeal; (5) a list of desirable personal traits to be marked by the pupil for those strong and weak in himself; (6) a request for information about things done *outside of school* which might disclose work interests; (7) a new classification of kinds of occupational activities among which the pupil indicates his first three preferences; (8) a record of how the pupil expects to start when he begins work; (9) an opportunity at the close for the pupil to summarize his ideas about his vocational choice and to assemble the reasons for believing that the vocation best meets his own interests; (10) a record to indicate what people helped by advice to direct the pupil's choice and the kind of advice received.

#### CLASSIFICATION OF OCCUPATIONAL ACTIVITIES

Two new features of the method may be emphasized, namely, the classification of kinds of work activities and the paired con-

trasts of work conditions. Any attempt at occupational classification is most difficult when one considers that some 17,000 occupational designations are listed in the federal index of occupations. The census classification, which is most frequently used, is hardly serviceable in training the pupil to approach the problem by observation of his own experiences. It starts with the following broad groups: agriculture, forestry, and animal husbandry; extraction of minerals; manufacturing and mechanical industries; transportation; trade; public service; professional service; domestic and personal service; clerical occupations. These are suggestive but fail to reach various distinctions in types of vocational interests found among high-school pupils. Neither do the usual classifications of vocational ambitions of high-school pupils reach what seems to the writer to be more fundamental work habits and interests which allow opportunity for special aptitudes and give promise of the most permanent satisfactions in a life work. It may be added that when the Personal Branch of the General Staff of the United States Army attempted to work out a classification index of trades needed in the army it was found useful in practice to bring together those occupations using similar habits and working with similar tools.

The classification which we tried was a venturesome attempt to get away from the industrial framework to the kind of skill required. Furthermore it was the satisfaction of the pupil's special interests which he was urged to seek. He was asked for example, whether he liked to operate machines, to do work requiring delicate muscular movements, to influence people by direct or by indirect appeals, to make and systematize records, to do scientific work, etc. Each field of interest was followed by illustrations. An occupation might require several kinds of activities but the pupil was led to indicate the three major interests, which he wished to consider further.

The full statement of this part of the work appears below with the proportion, in a thousand choices of the Pittsburgh pupils, choosing each group. The results show the distribution of first, second, and third choices combined, instead of the first

choices alone. This better represents the weight of the less common interests. The most favored groups of activities were substantially the same whether the first choices alone were considered or the combined first, second, and third choices. For example, all the six most frequent first choices among the boys and five of the six most frequent among the girls were also among the most frequent six when the first, second, and third choices were combined. The data were compiled not from the complete set of 8,500 papers but from a random sample of 1,666 papers, 582 of which were boys. Each fifth paper in each of the eleven schools including the junior and business high schools, was selected as sufficiently representative for the summary. Among these papers 347 were rejected because three occupational preferences were not indicated. Only one pupil among the 1,666 attempted to be facetious. From the nature of the replies it may be confidently claimed that the blank was answered seriously.

#### CLASSIFICATION OF INTERESTS

Under this heading the pupils were directed as follows:

Select the three KINDS OF ACTIVITIES listed below at which you think you would do best and at which you think you would be contented to work permanently. Place the figure "1" before that group which you would place first for yourself. Place "2" before your second choice, and "3" before your third choice.

Remember the unpleasant features of the work and the conditions under which it would be carried on. Consider also whether you have the necessary health and strength, whether you can get the necessary training, and whether this occupation will give you the opportunity to utilize your good traits and follow your interests.

Any occupation will involve a number of these activities, but number only those three groups which appeal most to you. Sometimes it is well to begin by excluding those you dislike. It may help you if you will also compare yourself with others of your own age.

Results were obtained as shown in Table I, the figures indicating the proportions per thousand of combined first, second, and third choices:

TABLE I.—WORK INTERESTS AMONG THE HIGH-SCHOOL  
PUPILS OF PITTSBURGH

GROUPS OF ACTIVITIES	COMBINED FIRST, SEC- OND, AND THIRD CHOICES PER THOUSAND	
	Boys	Girls
<b>GROWING PLANTS</b> , as in farming, gardening, greenhouse, etc.	65	85
<b>CARE OF ANIMALS</b> , as in stock raising, care of horses, etc.	46	21
<b>OPERATING ENGINES</b> , as locomotives, automobiles, steam plants, etc.	127	11
<b>OPERATING MACHINES</b> , as in manufacturing, using linotype, etc.	33	2
<b>INSTALLING EQUIPMENT</b> , as electrician, plumber, gas fitter, etc.	38	0
<b>CONSTRUCTION WORK</b> , as in building, concrete work, railroad and highway construction, engineering, etc.	113	1
<b>DELICATE MUSCULAR MOVEMENTS</b> , as dentist, instrument maker, woodworker, etc.	16	2
<b>DISCOVERING AND REPAIRING DEFECTS</b> , as jeweler, automobile repairman, telegraph repairman, etc.	51	2
<b>TRANSPORTING ACTIVITIES</b> , as railroad operation, express, mail, etc.	30	3
<b>MEETING AND DIRECTING PEOPLE</b> , as secretary, floor manager, conductor, etc.	22	53
<b>TEACHING</b> , as in school, shop, etc.	13	162
<b>WELFARE WORK</b> , as in social settlements, industrial plants, Christian Associations, churches, etc.	11	102
<b>ADVISORY SERVICE</b> , as physician, lawyer, consultant, banker, etc.	73	29
<b>ORGANIZING PEOPLE</b> , as in societies, in work gangs, in industrial and business concerns, etc.	11	14

TABLE I.—(Continued)

GROUPS OF ACTIVITIES	COMBINED FIRST, SECOND, AND THIRD CHOICES PER THOUSAND	
	Boys	Girls
<b>INFLUENCING PEOPLE DIRECTLY</b> , as in selling, preaching, campaigning, etc.	22	15
<b>INFLUENCING PEOPLE INDIRECTLY</b> , as in advertising, writing, newspaper work, etc.	18	33
<b>ORGANIZED PLANNING</b> , as in business, in managing institutions, in developing engineering projects, etc.	57	3
<b>SCIENTIFIC WORK</b> , as in laboratories, in museums, in research, etc.	114	34
<b>RECORDING AND SYSTEMATIZING RECORDS</b> , as in office work, stenography, bookkeeping, library work, etc.	58	174
<b>ENTERTAINING PEOPLE</b> , as musician, actor, speaker, etc.	33	110
<b>ARTISTIC SKILL</b> , as in decorating, window dressing, millinery, costuming, handicraft, printing arts, etc.	17	81
<b>ARTISTIC CREATION</b> , as in writing, designing, composing music, etc.	16	52
Field of activity not on this list and described as follows: ( <i>here the pupil made his own entry</i> )	15	11

As to the adequacy of the classification, it may be said that for the ambitions of high-school pupils the grouping proved to be surprisingly satisfactory. Difficulties occurred with certain specific occupations with sufficient frequency to indicate the advisability of a revision or at least of the addition of those particular occupations to the illustrations of the general fields. For example, *nursing* might be added to "welfare work," and *architecture* to either "artistic creation" or "construction work." *Drafting* might follow the illustration of *engineering* under "construction work." The teaching illustrations should include *music* and *expression*; and *purchasing agent* might follow *business*.

under "organized planning." Ambitions such as those for the army or civil service apparently need further analysis to discover the main interests. In the army, for example, is it an interest in commanding, in organizing, or in engineering? It is not to be expected that any classification will escape ambiguity; but if the pupils are led to consider the habits of thought and action to be emphasized, an important step in the proper adjustment to a vocation will have been taken.

The writer has no quarrel with those who contend that tables of the opinions of pupils about their vocational aptitudes have little ultimate worth since the pupils are too immature to settle such questions. It is during the high-school ages, however, that such choices are planned even if they do shift in three months. *The purpose of the blank is not to gather statistical data.* In bold face type at the top of the first page of the blank under the title "Analysis of Work Interests," is the statement: *The purpose of this blank is to help to discover special interests and abilities by suggesting how to observe one's own likes and dislikes.* Nevertheless a tabulation of the results does give a cross-section of the minds of these high-school students at the time of filling out the blank.

#### PAIRED CONTRASTS IN WORKING CONDITIONS

The second innovation to which attention may be directed was the presentation of *pairs of contrasts* between some or all of which the pupils would find distinct differences in their own interests. This portion of the blank is represented in Table II. It was suggested by the contrasts which Dean Herman Schneider<sup>1</sup> of the Engineering College at the University of Cincinnati, had found useful in practice. The ratio of selections for boys and for girls is shown for each pair. The attempt was made so to state each number of contrasting pairs that either one of the pair would indicate a commendable characteristic of the individual depending upon the kind of work. The direction to the pupil was: "So far as you can notice a difference in your own interests

<sup>1</sup>"Selecting Young Men for Particular Jobs." See Bloomfield Meyer, *Readings in vocational guidance.* New York: Ginn & Company, 1915.

TABLE II.—INTEREST CONTRASTS

CONTRASTED WORKING CONDITIONS	RATIO		NUMBER OF CASES	
	Boys	Girls	Boys	Girls
Slow movements	1	1		
Rapid movements	6.7	7.3	710	815
Less responsibility	1	1		
More responsibility	6.1	3.9	706	796
Doing the same thing	1	1		
Wide variety in work	5.1	5.8	722	834
Methodical work	1	1		
Meeting new conditions	6.5	5.0	676	775
Regular time for work	7.7	9.4	725	865
Irregular time for work	1	1		
Larger future success	15.6	7.7		
Smaller immediate success	1	1	715	830
Work requiring calmness	1	1		
Work requiring enthusiasm	1.7	2.9	710	827
Changing from place to place	1.2	1		
Always working in the same locality	1	1.1	696	817
Greater pay with risk or discomfort	1	1		
Less pay with more safety and comfort	2.3	5.2	694	832
Indoor	1	1		
Outdoor	3.3	1.6	699	813
Original	9.6	7.8		
Imitative	1	1	648	778
Planning	2.0	1.1		
Carrying out plans	1	1	657	775
Skilled hand work	3.4	8.8		
Skilled heavy work	1	1	619	718
Broad planning	1	1		
Attention to details	1.6	2.0	624	724
Directing	3.3	1.4		
Following directions	1	1	664	782
Working by yourself	1	1		
Working with others	1.5	1.5	704	802
Working with things	1	1		
Working with people	1.0	3.7	666	799
Thoughtful hand work	1	1		
Thoughtful head work	5.2	3.4	687	804

Table reads: Rapid movements were preferred to slow movements 6.7 times as often among the boys and 7.3 times as often among the girls, these figures being derived from the responses of 710 boys and 815 girls, etc.

between each of the following contrasts, check those *working conditions* which appeal to you."

The individual peculiarities of the pupils are brought out clearly by these paired contrasts. When a pupil's record is compared with the general trend of the high-school pupils, it is possible to show him at once in what interests he is strikingly different from the rest of his group. For example, eight out of nine boys and nine out of ten girls checked "regular time for work" as contrasted with "irregular." For those who prefer regular time for work this is not important but for the one boy in nine who checks "irregular time for work" the vocational counselor has at once a promising point of inquiry as to the special interest of the boy. It is these special and individual characteristics which are most difficult to discover and which should prove most illuminating within the general level of mental ability of high-school pupils. A pupil who is quite unusual in a number of these choices has thus a cue to his individuality—a cut which offers a new approach to his vocational adjustment if he hopes to utilize his personal incentives. Such knowledge on his part may suggest the type of work, within any one of a number of broader fields, in which he seems likely to find most happiness.

A number of sex differences became evident. For example, 20 percent of the girls compared with 14 percent of the boys chose "less responsibility"; 26 percent of the girls and 37 percent of the boys chose work requiring calmness rather than enthusiasm; 16 percent of the girls and 30 percent of the boys preferred "greater pay<sup>2</sup> with risk or discomfort"; 38 percent of the girls and 23 percent of the boys preferred indoor to outdoor work; 48 percent of the girls and 33 percent of the boys preferred planning to carrying out plans; 58 percent of the girls and 77 percent of the boys preferred directing; 79 percent of the girls and 50 percent of the boys preferred working with people rather than with things. These differences seem to be quite in line with what might be anticipated as to the sexes and therefore support the validity of the method.

This section of the blank has proved so suggestive that the method of "paired interest contrasts" has been further developed

by the writer and utilized in connection with the record of personal history filled out by each freshman entering the Carnegie Institute of Technology. Thirty-five contrasting pairs were included in the blank for entering freshmen. From this larger number of contrasts it seems possible to distinguish differences among groups of students entering different courses in the same college, for example, between those specializing in secretarial work and in household economics.

#### OTHER SECTIONS OF THE BLANK

That part of the blank which lists a series of desirable personal traits, among which the pupils are to check the strong and weak traits in themselves, shows some results which suggest the difficulties of utilizing such information in connection with vocations. However useful it may be for a pupil to evaluate these traits in himself, nobody has yet demonstrated that any of them are more important for one vocation than for another. Further to understand the results of the present study, the actual procedure followed on the blank should be noted. This section was headed as follows:

Among the following DESIRABLE TRAITS underline the *seven* in which you are strongest and in which you could trust yourself most to meet the competition of others. Among the seven, underline with two lines the *two* strongest in you. Among all the traits given below, place crosses before the *two* in which you are the weakest.

This was followed by the list of traits, beginning with those of the more intellectual type. These were: accuracy, common sense, concentration, foresight, imagination, information, initiative, judgment, memory, originality, planning, quickness, reasoning, thoroughness.

Another group of traits followed emphasizing volition and emotion: ambition, cheerfulness, convincingness, courage, courtesy, energy, enthusiasm, health, helpfulness, honesty, industry, leadership, loyalty, neatness, obedience, patience, perseverance, reliability, self-control, tact, self-reliance, resourcefulness, temperance, uprightness.

A random sampling consisting of the responses from about 250 boys and 250 girls was tabulated. This indicated which traits were more likely to be checked. Honesty, for example, was most frequently marked, i. e., by 17 percent of the boys and by 24 percent of the girls. The traits most often regarded by the boys as one of their two strongest characteristics (with their frequencies per thousand) were: honesty, 172; ambition, 91; common sense, 68; health, 58; imagination, 48; loyalty, 48; obedience, 44; cheerfulness, 41. Traits similarly regarded by the girls were : honesty, 243; common sense, 67; health, 67; imagination, 61; obedience, 61; memory, 47; cheerfulness, 45; self-control, 40.

The traits most frequently marked as weakest by the boys (with their frequencies per thousand) were: patience, 120; accuracy, 88; concentration, 83; leadership, 73; imagination, 73; memory, 73; quickness, 54; convincingness, 46. Traits similarly marked by the girls were: patience, 112; leadership, 95; accuracy, 82; concentration, 67; imagination, 63; foresight, 58; quickness, 54; memory, 46; planning, 46.

To a considerable extent these strong and weak traits represent the qualities for which pupils in school are most commonly praised or blamed. They reflect the comments of teachers and relatives. It may be added, however, that the opinions of the closest acquaintances of these pupils in general agree with the responses of the pupils themselves.

An attempt was made to discover whether there was a correspondence between traits regarded as strong and preferred vocations. This was done by examining first the traits underscored by the boys who chose the following four kinds of work activities: "construction work," "advisory service," "scientific work," and "recording and systematizing records." Examination was then made of the traits underscored by girls who preferred "recording and systematizing records" and "teaching." Four of the seven traits most frequently regarded as strong by the boys in each of these four fields were also among the six strongest among all the boys. Four of the seven strongest traits among the girls choos-

ing teaching and record keeping were also among the seven strongest among all the girls. As pronounced a similarity appeared for the traits marked weak. The prospect of finding broad traits like those listed which differentiate occupational interests is, therefore, not promising. When any series of traits is used, it would be better to ask the pupils to consider the traits not generally but in relation to the vocation they are contemplating.

#### INTERESTS IN SCHOOL SUBJECTS

The vocational significance of preferences for certain groups of subjects like commercial subjects, art, music, industrial subjects, and mathematics, seems fairly clear in many individual cases. The general distribution of the preferences among 582 boys and 736 girls selected at random is given in Table III. In filling out this part of the blank, pupils were directed to indicate the *two* groups of school subjects that had most interested them. Under each group was printed a list of specific subjects, and in each of these lists the pupils were asked to underline their preferences. They were also requested to put a "T" before the preferred groups of subjects for which their interest was due mainly to the teacher and an "S" where the interest was due mainly to the subject itself. First and second choices and preferences due to subjects and teachers are combined in Table III.

Activities carried on outside of school for recreation or otherwise, were sounded out by a section of the blank headed: "What

TABLE III.—INTERESTS IN SCHOOL SUBJECTS

GROUPS OF SUBJECTS	FIRST AND SECOND CHOICES PER THOUSAND		GROUPS OF SUBJECTS	FIRST AND SECOND CHOICES PER THOUSAND	
	Boys	Girls		Boys	Girls
Art . . . . .	41	81	Household Economics . . .	0	118
Commercial Subjects . . . . .	124	225	Industrial Subjects . . . . .	180	4
English . . . . .	110	228	Mathematics . . . . .	134	66
Foreign Language . . . . .	70	88	Music . . . . .	32	84
History and Civics . . . . .	74	48	Science . . . . .	234	58

do you do OUTSIDE OF SCHOOL, for recreation or otherwise, that you think will help you in your future occupation? For example: kind of reading, your hobbies, exhibitions or places you visit, your work in church, clubs, etc., etc." The answers of 117 boys were examined; 38 were found to be vocationally suggestive and 7 slightly so. For 73 girls, 22 were suggestive and 10 slightly so. Naturally the majority are not differentiated by those avocations.

#### SUMMARY

The idea of helping high-school students to observe their own vocational tendencies was tried out with considerable success. The method was to fill out a blank which analyzed and summarized those interests which bore more or less directly upon vocational satisfactions. Employment experiences, school subjects, contrasting work conditions, avocations, etc., were brought under consideration. In asking for a choice, the occupational fields were classified according to the types of activities emphasized. The table of common tendencies in marking pairs of contrasted interests affords a basis for noting individual peculiarities. This and the preliminary occupational classification are new features which seem promising. Even as a group exercise the method proves stimulating. Parents become interested when the pupils take the blanks home for discussion, and vocational counselors find them an excellent introduction to their interviews.

#### SUGGESTIVE BLANKS

Atlanta, Georgia, Vocation Bureau, George D. Halsey. *The "averaged-opinion" plan of vocational guidance.*

Bureau of Personal Research, Carnegie Institute of Technology, Pittsburgh, Pennsylvania. *Interest analysis blank.*

Business Training Corporation, New York, New York. *Self-analysis. In its course in modern production methods.*

Erie, Pennsylvania, School District. *Self-analysis for counseling purposes.*

National Institute for Moral Instruction, Chevy Chase, Washington, D. C. *The perfect human being.*

Puffer, J. Adams, Hudson, Massachusetts. *Vocational guidance Chart for men.*

Bugg, H. O. "Self-improvement through self-rating: a rating scale for judging high school or college students," and "Self-improvement of teachers through self-rating." *Elementary School Journal*, 20: 670-684. 1920.

Yerkes, Robert M., and La Rue, Daniel W., *Outline of a Study of the Self*, Harvard University Press, Cambridge, Massachusetts.

Young Men's Christian Associations, International Committee. Boy's Work Committee. *Self-analysis blank.*

Young Men's Christian Association of Chicago, High School Department. *Individual analysis blank.*

## INTELLIGENCE AS RELATED TO NATIONALITY

GILBERT L. BROWN

*Northern State Normal School, Marquette, Michigan*

This investigation grew out of a study of retardation in the schools of several cities in northern Michigan in which it was discovered that the amount of retardation varied among children of different nationalities. Since the pupils of all nationalities had the same teachers and were pursuing the same course of study, it was evident that there must be some underlying cause of the difference in retardation. Accordingly, it was decided to give intelligence tests to a considerable number of each nationality to determine whether or not the differences in retardation might be the result of differences in intelligence. At the present time 913 children whose parents were born in foreign countries have been given intelligence tests.

### METHOD OF INVESTIGATION

The Stanford Revision of the Binet Scale was employed throughout the investigation. Group tests would not have been practicable, especially in the lower grades, because the children of foreign parents have not ordinarily become as responsive as American children, and because many of them do not understand the English language sufficiently well to follow directions.

It was soon found that language presented the chief difficulty in testing the children, although this problem generally disappeared above the first grade if the pupil had entered the kindergarten in this country, or above the second grade if he had entered the first grade in this country. In other words, it was found that after a pupil had attended an American school for one or two years, he tested as high by employing the English language as by using his native tongue. Of course, there were some exceptions to this general principle, since children vary greatly in their ability to learn language. In all cases, however, in which there was any doubt as to a pupil's ability to understand English sufficiently well to pass a test, he was given the test in his native language. Not infrequently we found children who, although they spoke

the English language fairly well, tested from six to eighteen months higher when their native language was employed.

### RESULTS

Pupils representing nine nationalities have been studied. These are the Norwegian, German, Swedish, English, Austrian, French, Finnish, Slovak, and Italian. Table I shows the distribution of the nationalities according to intelligence quotients; Table II, the percents of the nationalities at each mental level and the theoretical distribution as suggested by Terman.

TABLE I.—DISTRIBUTION OF 913 SCHOOL CHILDREN ACCORDING TO INTELLIGENCE AND NATIONALITY

CLASS	INTELLIGENCE QUOTIENTS	NORWEGIAN	GERMAN	SWEDISH	ENGLISH	AUSTRIAN	FRENCH	FINNISH	SLOVAK	ITALIAN
Genius or "near" genius	Above 140	0	0	0	1	0	1	3	0	0
Very Superior.....	120-139	1	9	24	16	2	15	13	0	1
Superior.....	110-119	4	14	37	10	3	15	21	3	0
Normal.....	90-109	24	30	84	41	15	87	98	7	11
Dull.....	80-89	3	10	29	9	3	47	43	9	10
Borderline.....	70-79	2	4	8	7	4	25	32	9	15
Moron.....	50-69	0	0	3	3	1	7	13	3	13
Imbecile.....	20-49	0	0	2	3	0	2	3	0	1
Total.....		34	67	187	90	28	199	226	31	51

TABLE II.—PERCENT OF CHILDREN AT EACH MENTAL LEVEL

CLASS	THEORETICAL DISTRIBUTION	NORWEGIAN	GERMAN	SWEDISH	ENGLISH	AUSTRIAN	FRENCH	FINNISH	SLOVAK	ITALIAN
Genius or "near" genius.....	0.25	0	0	0	1.1	0	0.5	1.32	0	0
Very Superior.....	6.75	2.9	14.0	12.7	17.7	7.14	7.52	5.75	0	1.96
Superior.....	13.00	11.6	21.0	19.6	11.1	10.80	7.52	9.30	9.70	0
Normal.....	60.00	69.6	49.4	44.5	45.5	53.57	43.66	43.30	22.58	21.56
Dull.....	13.00	8.7	12.0	15.4	10.0	10.80	23.60	19.00	29.00	19.60
Borderline.....	6.00	5.8	3.5	4.2	7.7	14.28	12.55	14.16	29.00	29.41
Moron.....	0.75	0	0	1.6	3.3	3.57	3.51	5.75	9.70	25.49
Imbecile.....	0.19	0	0	1.0	3.3	0	1.32	1.32	0	1.96

The difference in the intelligence of the various groups may be expressed by the medians of the intelligence quotients, and by the percents below "normal" intelligence. These data are shown in Table III. It is clear that in the case of the children tested there is a wide range of intelligence, based upon nationality.

TABLE III.—MEDIAN INTELLIGENCE QUOTIENTS AND PERCENTS BELOW NORMAL

NORWE-GIAN	GER-MAN	SWEDE	ENG-LISH	AUS-TRIAN	FRENCH	FIN-NISH	SLOVAK	ITAL-IAN
103.75	102.3	101.9	101.75	99.5	95.4	90	85.6	77.5
14.5	15.5	22.2	24.3	28.65	40.96	40.23	67.23	76.56

#### DISCUSSION

An examination of the above tables brings out the interesting fact that all the Germanic groups—Norwegian, German, Swede, English, and Austrian—test higher than any of the non-Germanic groups. This agrees with results obtained in the army, and tends to confirm the belief held by many that the best type of immigrant comes from the countries of northern Europe.

This fact also throws light upon the problem of retardation and elimination among the various nationalities. The cause of these school conditions has been commonly regarded as primarily social, but it is at least pertinent to inquire whether the chief cause may not be difference in intelligence. A recent study of the retardation of 1700 children of immigrants in two cities of northern Michigan shows that retardation according to nationality follows very closely the median intelligence quotients of the nationalities as given in Table III.

The extremely low intelligence quotients of the Italians may be accounted for in part by the fact that the children tested belonged to two mining locations in which the work pursued by the men is unusually slavish. The employers of labor in these locations recognize the low mentality of their employees, and one of them stated frankly that men of higher intelligence would not remain in the location because of the character of the work. Yet, it must be observed that, although the children of all nation-

alities tested low in these locations, none tested so low as the Italians. It is also significant that in these locations very few Italian children reach the eighth grade; most of them fail to advance beyond the fourth or fifth grade.

Probably the point of greatest significance lies in the fact that so large a percentage of children tested below "normal." This type of pupil impedes the progress of other children in school and, because of repeating the work of the same grade, causes additional school expense. Furthermore, if the school is to offer proper training for such children it must provide a course of study different from the one now offered.

The importance of the mentality of immigrants is not confined, however, to the field of education. The admission into this country of large numbers of immigrants of relatively low intelligence presents two problems of primary importance when viewed from the standpoint of national welfare. First, this type of immigrant increases the amount of crime and pauperism. This would be expected since it seems well established that a rather high correlation exists between low intelligence, on the one hand, and crime and pauperism, on the other. Second, low intelligence among large numbers of immigrants means that in coming generations the general intelligence of the American people is likely to be lowered, because the number of children in the homes of such people is much greater than the number in the homes of people of higher intelligence. These problems should make it clear that, in establishing conditions for admission into the United States, the intelligence of the immigrant is of vastly greater importance than the number of dollars which he possesses. Furthermore, they mean that the method of determining the number of immigrants to be admitted by the percentages of the various nationalities already in this country is fundamentally wrong, since the intelligence of immigrants from some countries is decidedly superior to that of the immigrants from other countries.

## Editorials

### THE HISTORICAL METHOD IN EDUCATIONAL RESEARCH

The tendency is altogether too evident to restrict the term "educational research" to a particular field. Research is not a field but a method, a way of approach to the solution of problems. It is also a point of view. Not only the making of tests and the use of them, but child and financial accountancy, curriculum and textbook analysis, buildings and building programs, and a host of other topics offer opportunities for investigation. Although the present educational research worker may dissent from our views, we venture the assertion that the history of education likewise affords a field for original inquiry and that this field is particularly interesting and stimulating. Quite commonly we hear the opinion expressed that the history of education has little practical value. Except as this opinion relates to certain wooden ways of teaching and writing about the subject, we dissent from it. We believe that much that is practical—even the kind of practicality upon which the most pragmatic of modern researchers insists—may be derived from the right kind of treatment of historical material.

Consider writing as a school subject. An adequate historical treatment of the way writing has been taught and of the social demand for it will give us a useful basis of criticism for present practice. It is clear that the social demand has undergone enormous changes. Vestiges of the former condition remain with us in our phrase "the three R's"—one of the R's, with sturdy disregard for modern spelling, standing for writing.

The former status of handwriting interprets and explains its present status. But it can only be vividly apprehended by reference to historical data. In the Colonial period the newspapers

contained many advertisements of writing teachers. Professor Robert F. Seybolt of the University of Illinois has a fine collection of them and it is to him that we are indebted for a slight acquaintance with them. These advertisements show unmistakably the high estimation in which "a good hand" was then held. We have space to consider but one set of them. William Elphinstone advertised first in the *New York Gazette* (1753) that "Persons of both Sexes from Twelve Years of Age to Fifty, who never wrote before, are taught to write a good legible Hand in five Weeks, at an Hour a Day, at home or abroad; and such as write but indifferently may have their Hands considerably improved." A year later Mr. Elphinstone was in Philadelphia where he advertised in a similar manner in the *Pennsylvania Gazette*. Returning to New York, he again published his promising announcement. He also lived in Boston where his "card" appeared in the *Weekly News Letter* (1755).

Announcements such as those of Elphinstone—and they were surprisingly numerous—establish, upon a firm historical basis, the fact that writing was at that time vastly more important as a personal accomplishment than it is now. Indeed, we scarcely have in this age a class of teachers resembling the writing teachers of Colonial days.

Moreover, historical inquiry will give us the fact basis of the social demand for writing. Until comparatively recently all records, documents, and communications, except those of which many copies were desired, had to be handwritten. Conveyances, mortgages, judgments, etc., were not only written by hand but were copied for legal record by the same process. Letters were written, as were reports and memoranda of every description. The works of novelists, essayists, and poets were all handwritten. The scrivener plied his trade.

The historical treatment will record the more recent advent of the typewriter and will show the number of offices in which these machines were placed. The book typewriter replaced the hand copying of records, and listing machines together with loose-leaf and card records modified the processes of bookkeep-

ing. Boys and girls still learn to work in offices, but for this purpose they learn typewriting rather than handwriting. Indeed, writing by hand, it may be shown, is now generally done only by those who have little of it to do.

The historical treatment of the question of writing will also bring out the fact that there is not only a smaller demand for this school product but also that the demand is different in kind. In earlier days there was a widespread demand for excellent quality of handwriting. To say that a person "wrote a good hand" was to bestow high praise. Indeed, the ability to write well was taken as unmistakable evidence of culture. Today it is doubtful whether people who write more skillfully than legibility requires win any appreciable praise or take any particular pride in their accomplishment.

When the investigator has by the historical method brought matters down to this point, he may adopt some of the more conventional methods of the day. He may show, for example, by experimental data that writing of Quality 12 on the Thorndike scale or of Quality 65 on the Ayres scale is practically as legible as handwriting can be. From this he will deduce that prolonged practice in writing after this degree of legibility has been secured is a waste of time. He will point out that as writing has become less of a business asset, the value of unusual skill has been greatly diminished, that decorative and artistic qualities are seldom considered, and that accordingly, the task of the school has become relatively simple. Here he may give evidence to show that, despite these facts, the schools are continuing to do the traditional thing. The dead hand is upon them. New writing systems appear regularly. Boys and girls are drilled on ovals, loops, and lines which bear no resemblance to the letters of the alphabet. We still act as if we believed implicitly in formal discipline, although in theory we deny it. Adverting to the psychology of learning, the investigator may call to our mind the fact that if we wish to engender an ability or organize a habit, we should teach the thing directly and drill upon it directly. "By indirec-

tions to find directions out" is discredited by the psychologist while it is practiced by the school teacher.

The historian of education, therefore, may point out that in handwriting the school has failed to adapt its curriculum to changed conditions; and it is his peculiar privilege to show why this is true. Writing, however, is only an illustration. Other school subjects either present similar conditions or offer from other points of view instructive lines of investigation for the historian. Nor is this less true of matters of school organization, teacher training, salaries, and methods of teaching than it is in the case of the curriculum. Moreover, the historian always has, or should have, within his view the development of society and the extent to which modifications in the school are adapted to social conditions. Contributions exemplifying methods of historical research as applied to questions of educational import will be gladly received for publication in the *JOURNAL OF EDUCATIONAL RESEARCH*.

B. R. B.

### THE SUPPORT OF PUBLIC EDUCATION

It was heartening to hear Professor Seligman declare before the Department of Superintendence at Chicago that we are well able to support public education in the United States. He called attention to the fact that we are the wealthiest people in the world, and that our wealth and income have increased rather than diminished during the decades just past. In his discussion of the methods which must be employed to provide the necessary funds for education he stated that economic changes occurring during the past few decades have rendered reliance on the general property tax unsatisfactory. That the general property tax does not measure ability to pay taxes has long been established. It is not possible to tax intangible property which represents in the aggregate a very large part of our wealth. It is equally clear that there is no fixed relationship between property values and income derived from property. The assessed value of a farm or factory does not represent the profit accruing to the owner in either case.

It is obvious that two merchants having at a given time the same amount of property will vary tremendously in their ability to pay taxes during any fiscal year due to the period of turnover and to other considerations. There are large professional incomes which may entirely escape taxation under the general property tax.

If the increasing wealth of locality, state, and nation is to contribute its proper share to the support of public education, we shall have to revise our revenue system by taxing earnings, profits, and income. Professor Seligman pointed out that it was necessary to develop on the one hand the personal income tax, and on the other hand the business tax to include not only corporations but other businesses. With the basis of taxation broadened, greatly increased revenues will be available for the maintenance of schools and for other forms of governmental service.

We need to scrutinize our expenditures for public education and to improve our practices in the field of fiscal administration. Better budgetary procedure and accounting than are now found will form the necessary basis for a more efficient administration of our schools. But while we work to eliminate waste and to increase our efficiency we must at the same time examine carefully our systems of taxation in the several states and work for the development of revenue systems which will make it possible to tax our citizens in terms of their ability to pay. Because of our interest in public education, we shall have to become students of taxation. As we become convinced that the general property tax is unsatisfactory, we shall have to join with other enlightened citizens for the development of a better revenue system. It is high time that those who are interested in providing adequate support for public education in the United States turn their attention in this direction.

G. D. S.

## Reviews and Abstracts

YEOMANS, EDWARD. *Shackled Youth*. Boston: The Atlantic Monthly Press, 1921. 138 pp.

Having read this book with a good deal of care, the reviewer approaches his task with some temerity. The author has so often and so vigorously declared himself to be the advocate of little children, (and withal said so much with which everyone will agree,) that negative criticism will be resented by the uncritical reader. He will doubtless be more ready to see a reflection of the reviewer's blindness, or inertia, or sterility, or any other of the numerous attributes which Mr. Yeomans has assigned to the school people of today, than to realize that nothing is true simply because some one has declared it to be so.

The subtitle "Comments on Schools, School People, and Other People" suggests the field but gives little clue to the burning message the author feels called upon to deliver. The keynote is contained in the following quotation (p. 6): "We dare to say—that there is only one kind of person really eligible as an administrator or teacher of a school—namely, an artist; for is not teaching an art?" A great many of us will agree, and yet if you and I and Mr. Yeomans should together observe a teacher or an administrator at work, it is quite conceivable that we might disagree among ourselves as to whether the person observed were an artist, or at least as to the degree of his artistry.

The ideal teachers of history, geography, etc., who are presented to us by Mr. Yeomans merit our admiration and challenge our efforts. But do all teachers fall into the two classes,—a fraction of one percent such as are described for our edification, and ninety-nine plus percent the pitiable caricatures which are sketched for the sake of contrast? Moreover the questions these caricatures ask show plainly that the writer knows little of what is really taking place in literally hundreds of schoolrooms throughout the nation, or else he has deliberately caricatured for the sake of contrast.

We prefer to believe the former. We should rather think that Mr. Yeomans, having caught a glimpse of the thrill which children receive when in contact with one who knows and loves his own field of knowledge, and having seen a few sterile teachers and remembered perhaps his own unfortunate youth in a New York suburb, has reached the conclusion that practically all our children are shackled, somewhat as he ascertained in another connection that "ninety-five percent of all children are average."

On the whole the book is worth reading by the critical. He who is sensitive to the ideal will draw inspiration from certain characters portrayed; he who will evaluate the unsupported statements will draw no discouragement or pessimism therefrom. If you are critical and a teacher, you may still return to

your schoolroom with joy in your heart and feel that you are not necessarily deficient in either the sense of smell or sight because you do not perceive that "all you are doing is to keep the pot boiling and that out of that pot comes a very bad smell" or that "evidently [the schools] are not functioning in such a way as to justify any more hope for increased happiness, for Peace on Earth, Good will toward Men than the present state of society, the level of each being the same."

E. J. ASHBAUGH

*Ohio State University*

WEATHERSBY, WILLIAM HENINGTON. *A history of educational legislation in Mississippi from 1798 to 1860.* (Supplementary Educational Monographs, No. 16.) Chicago: University of Chicago, 1921. 204 pp.

This is the third of the University of Chicago monographs prepared under the direction of Dr. Marcus W. Jernegan on the history of educational legislation in various states in the first half of the nineteenth century. As in the two preceding studies, much valuable and ordinarily inaccessible material has been made available, and this, together with the discussions of factors accounting for legislative enactments and their results, constitutes a history of the state school system in an important and long neglected phase of its development.

The educational history of Mississippi is interesting because the state is located in a section of the country which has received little attention from historians of education and because, as Dr. Jernegan points out, its settlers came largely from the "back-country" of the older southern states into an environment that was essentially western. Conditions in the southwest therefore approximated those in the Northwest Territory. The question may well be raised, says Mr. Weathersby, whether the educational history of Virginia and North Carolina applies to the states of Alabama, Mississippi, Arkansas, and Louisiana with any greater degree of accuracy than the stories of the development of New England and New York apply to the states of Ohio, Indiana, and Illinois.

In the earlier chapters of the book the influences affecting school legislation and general characteristics are discussed. These last, as relating to common schools, are listed as follows: (1) the development of township schools, built usually upon the sixteenth section with income from the same; (2) the tendency to make the township the unit of control; (3) a general absence of central control; (4) the education of orphans and poor children at the expense of the state; and (5) a reluctance to impose direct taxation for common schools. As a result of these tendencies we have the development of a "democratic, decentralized school system, designed to meet the needs or demands of individual counties or even smaller units."

Interesting parts of the monograph deal with federal and state aid to education. Chapter IV traces the history of the sixteenth section lands and the Literary Fund. The policy of township control, the authorization of ninety-nine year leases, the investment of state and township funds in the Planters' Bank and its subsequent failure, tell the story of the management

and loss of these lands and moneys. In Chapter XI the various means of school support during the period are summarized and classified.

The two appendices are noteworthy features of the book. The first consists of abstracts of charters of academies and higher schools; the second is a complete index of educational legislation in Mississippi prior to 1860, by titles of acts. These, as Dr. Jernegan states, contain "invaluable material for studies involving a history of comparative legislation." It is, however, to be regretted that the text of the most important laws has not been presented in the original form. A third appendix containing as much of the legislation as practicable, would constitute a valuable addition to the abstracts and summaries of the main part of the book.

Mr. Weathersby's monograph is the first important work on the history of education in Mississippi as well as the only work of its kind dealing with the educational development of the group of states which Mississippi represents. It is therefore a very real contribution to the history of public education in the south and in the United States.

JEAN H. ALEXANDER

*University of Minnesota*

THORNDIKE, E. L. *The Teacher's Word Book*. New York: Teachers College, Columbia University, 1921. 134 pp.

While not pretentious in its paper binding, this book contains the results of the most extensive investigation of its kind ever attempted. Dr. Thorndike says he has been gathering this material for ten years. It consists of an alphabetical list of the 10,000 most widely used words, as determined by a count of 4,565,000 from forty-one different sources. It is hoped that such a word list, according to the author, may prove of service to teachers in at least the three following ways:

1. To decide the pedagogical treatment to use for words offering difficulty to the pupil. In any one grade many words "probably should not be taught at all in that grade; others should be explained at the time to serve the purpose of the story but then left to their fate; others should be thoroughly taught and reviewed."
2. By use of the book, the beginning teacher can get a knowledge of the importance and difficulty of a word which an older teacher acquires only after years of experience.
3. It provides a convenient place where teachers can record useful facts about the teaching of a word, which will serve as guides for future teaching, such as the following: in what grade the word should be taught; in connection with what subject; and by what device.

The writer believes it will also prove of value to research workers by helping them to choose words which are to be used in tests and by aiding them in wording explanations and directions so they will be understandable to the pupil.

The list is not perfect, as Dr. Thorndike realizes. Further investigation will probably substitute a great many words for the ones now included. Its

value in the present form cannot be questioned and it is a book which every teacher should own.

WARREN W. COXE

*Ohio State University*

GRAFF, ELLIS U. *Essentials in Education*. Indianapolis: Bobbs-Merrill, 1921.  
245 pp.

If brevity is the soul of wit, then indeed Superintendent Graff has a wise and valuable book. He has been too ambitious. A perusal of the table of contents will reveal that he has attempted, in one brief volume, to run the whole gamut of educational problems: the teacher, teaching as a profession, curriculum, psychology, sociology, school administration, health work in the schools, school architecture, school building standards, school equipment, educational measurements, specialization in education, education and the nation, etc. The reviewer cannot but believe that the book would have been much more interesting and valuable had the author greatly reduced the number of vital subjects which he has introduced in the twenty-five chapters—each chapter devoted to a different subject.

A study of the chapter on methods will serve to illustrate the wide range of topics discussed in each of the other chapters, as well as the brevity of the treatment.

Many of the subjects, which are so briefly presented, have been the theme for a larger volume than this one. To a subject as important as "Methods of Teaching" (the title of chapter four) the author devotes fourteen pages. The first page or two of this chapter is a philosophical discussion of the aim of education. This is followed by a very brief psychological analysis of the principle of apperception, the doctrine of interest, individual difference, attention, association, reasoning, training the will, the emotions, and one paragraph to a consideration of special methods. For those who seek enlightenment on methods of teaching, this book would offer but little help.

We have no criticism of the author's viewpoint. The reader is impressed with his wide acquaintance with the best to be found in educational literature. We do not take issue with his philosophy, his psychology, or his position on other questions presented. Our quarrel with him is that he is too brief—the student is left to read too much between the lines.

*Essentials in Education* presents no new thought; it contains nothing original. In a clear, concise, and interesting style, many of the topics that have been widely discussed in recent years, are presented. The book is a popular statement of the trend of modern educational thought. It is not too technical for the "average citizen" to understand. It is a book that could easily be read and appreciated by high-school classes interested in teacher training or by first year normal-school students, as an introduction to teaching. Some of the state reading circles will probably find it a valuable text. *Essentials in Education* might well be called a summary of accepted modern educational practices.

H. L. DONOVAN

*Eastern Kentucky State Normal School*

LULL, HERBERT G. and WILSON, H. B. *The redirection of high school instruction.* Philadelphia: J. B. Lippincott Company, 1921. 286 pp.

The book sets forth "a program of instruction from the viewpoint of the social and psychological needs of high school students." These needs are analysed respectively in the second chapter on "The Social Core of the High School Curriculum" and in the fourth chapter on "Project-Problem Instruction." The remaining chapters describe the application of "socialized" and "project" methods to the prescribed subjects of junior and senior high school, to vocational and professional training, and to the end of cultural development. The final chapter contains surveys to classify the occupations of a typical small city as resources for socialized instruction and to describe various high schools in process of reorganization along the lines proposed. Pages 131-4 exhibit score cards to rate the success of teacher and pupils in project work. A classified bibliography is comprehensive and confined to references of very recent date.

The authors frankly urge that socialized and project methods are necessary in the secondary school if potential values are to be secured. The distinction is clearly drawn between the mere acquisition of technic and the use of this technic in such life situations as can be brought within the classroom. Each of the chapters bears upon this issue. Their cumulative effect should shake one's faith in purely formal methods. Considered therefore strictly as wholesome propaganda the entire work is admirable. By virtue of its popular appeal it should prove an excellent introduction to more comprehensive studies of the problems involved.

The effectiveness of certain forms of project work in the case of certain pupils is convincingly presented in the typical projects described. Taken together these illustrative chapters constitute a manual from which most teachers can select much of real value. Others, however, may easily be misled by the apparent finality of the argument. The restriction of content to what is largely familiar to the pupil and hence functional in itself, is no guarantee that the learning will function in the pupil's experience. Motivation for its own sake is worthless; hence the economy of the high-school project can be fairly judged only by comparison with other means of attaining the desired objectives. 'Know your pupils' is a better slogan than 'use the project method.' The reader should be cautioned against the exclusive use of methods that are not equally effective in all types of learning and which perhaps do not fully recognize the limitations of available teaching materials.

The criteria of high-school instruction are based on the pupils' "social" needs and these needs are interpreted in terms of the specific activities in which they are likely to engage. Chief emphasis is therefore placed on direct values. Instruction aims to secure appropriate responses to specific future situations by approximating these situations within the school. There is no question but that more of such instruction is desirable. Failure to secure these direct and specific values is too often minimized by the assumption that indirect and general values must automatically result. The limited abilities of many pupils doubtless justify this emphasis of direct values *for them*. One must however question whether these specific situations that the class is trained to meet are

actually encountered later by the majority of pupils and, if so, whether the acquired response is adequate. The limitations of teaching materials in most high-school subjects render both questions doubtful. Thus, for many pupils at least, greater economy is to be expected from the teaching of general concepts by materials organized with this particular aim in view. Though less readily identified with future needs, such learning is no less social than the outcome of project instruction since the project consists rather in what the pupil wants to learn than in what the social environment is. This distinction is not trivial if it helps to indicate a shortcoming of many discussions of subject values from the standpoint of motivation; namely, the failure to recognize the scope of future application as equal in importance to the degree of pupil response. The authors have outlined a program which is definitely helpful in the securing of direct values and as such it deserves high distinction. Yet the objective toward which high-school instruction might more safely be redirected is an effective combination of the specific value of the project and the more general value of methods that have still to be clearly formulated for the high-school program as a whole.

DOUGLAS WAPLES

*Tufts College*

*Course of study monographs*, Public Schools, Berkeley, California. Introductory—The Course of Study in the Work of the Modern School, Superintendent H. B. Wilson, 14 pages. Number One—Arithmetic, 91 pages; Number Two—Home Economics, 56 pages; Number Three—Nature Study, 104 pages; Number Four—Geography, 117 pages; Number Five—Penmanship, 28 pages.

These monographs, the results of committee reports and class-room testing, were issued in 1921. Others are to follow for the remaining school subjects. The Introductory Monograph by Superintendent Wilson, defines the aim of education as social efficiency, comprehended as including efficiency in five aspects of life—vital or physical, vocational, civic, avocational, and moral and religious. In each subject monograph, the place of the subject in contributing to these respective aspects is specifically stated. The outcomes of the subjects by which these forms of efficiency are achieved are stated for each half year in each subject outline in terms of knowledge, habits or skills, and attitudes.

According to the point of view stated by Superintendent Wilson, "The course of study should be so written and organized as to be an inspiration to the teachers in their work . . . It is not sufficient if it merely indicates the general scope . . . How (topics) should be varied to suit differences in pupils must be specified. In fact, all choices which depend for their correctness upon scientific investigation and research studies must be made for the teachers by the course of study . . . It must . . . indicate methods and procedures recommended because of their proven value . . . Standards of attainment expected by pupils should be set forth as definitely as possible." The respective courses therefore include much of method, procedure, outcomes, and

standards. All are well supplied with lists of equipment, sources of materials, and bibliographies; and each has a good index.

The arithmetic course is supplementary to an adopted text book, but it points to many local interests, problems, and projects; and it has many suggestions of method and procedure. Formal work is omitted until the second grade, but informal number experiences are included for the kindergarten and first grade. Standards of achievement are stated from grade III upward for the fundamental processes, and from grade IV upward for reasoning by the Starch Scale. Sixty minutes a week are given to arithmetic in grade II, and 200 minutes a week—forty minutes a day—in grades III to VI inclusive.

The home economics course includes the work for the fourth grade, where it begins, through the intermediate schools, high schools, and special schools. The work of the other monographs so far issued is for the first six grades only. The subject is planned for girls, but it is stated that "Boys and girls might exchange shop work for a few weeks. Camp cookery could be given to the boys while shop work is given to the girls." The outline emphasizes the technical aspects of the subject. The part for the elementary school is in marked contrast to the recently published course of Kalamazoo, Michigan, which is rich in informational values for the consumer, and stimulating in the variety of inquiries which its work initiates.

The nature study course deals almost wholly with plant and animal life, emphasizing gardening, elementary agriculture, study of flowers and birds, and care of pets. Extended suggestions for a great variety of school and home projects are made for each grade. The work is attractively presented, and most of it well illustrates "activity that leads to further activity."

In the course in geography, considerable space is devoted to procedure, suggested projects, discussion of types of lessons, and the use of local sources of material and points of approach. The work begins in the third grade with a study of the lives of children from ten different countries. The first half of the fourth year is devoted to a study of California, the second half to a study of the world through products. To the fifth grade are assigned North America, South America, Australia, and the Pacific Islands, and to the sixth grade, Africa, Asia, and Europe in this order. Sixty minutes a week are given to geography in the third grade, ninety in the fourth, 125 in the fifth, and 150 in the sixth. Geography receives less than one half as much time as arithmetic in the Berkeley schools. The topics and problems suggested are well chosen with reference to geographic interests of our own time.

The course in penmanship is chiefly a discussion of procedure, devices, records, tests, and standards. The Ayres Scale is the basis for rating achievement. A "system" with Teachers' Manual and graded Compendium is used.

In these courses of study, there has been a definite effort to utilize the results of the scientific studies in the selection, grading, and teaching of materials. There is little evidence of any effort to coordinate one subject with another and thus derive those values of economy of both time and effort which come from treating the materials of different subjects in their relationships to common problems. But, in the Letter of Transmittal, the chairman of the general committee states: ". . . we are ready to propose our next task—a

more complete synthesis of all subjects. This would be effected by increasing the number of projects and by grading them . . . Less regard would be given to the lines of cleavage between subjects inasmuch as the experiences provided . . . would be indicated in the series of problems and projects rather than by a gradation of subject matter . . . The various studies would be drawn upon for the help each could afford . . ."

The monographs constitute a contribution in the practical field of curriculum making, utilizing the results of scientific investigations and resources so far achieved. The work is a noteworthy effort to select and organize material on the basis of values objectively measurable.

FREDERICK G. BONSER

*Teachers College, Columbia University*

CARTER, ALEXANDER and THEISEN, W. W. *Publicity campaigns for better school support.* (School Efficiency Monographs.) New York: The World Book Company, 1921. 164 pp.

This is one of a series of School Efficiency Monographs. Its scope is somewhat narrower than the title might seem to indicate, since it confines its treatment of publicity campaigns to cities. It is to be regretted that the authors did not feel warranted in extending the scope of the monograph so as to include campaigns for better support of rural schools, and to statewide publicity campaigns to sell education to the public. We hope that another monograph covering these fields may be issued by the authors.

The following topics and problems are proposed and discussed in successive chapters: (1) are publicity campaigns for better school support advisable? (2) the campaign staff; (3) groups to be reached by the campaign; (4) avenues and instruments of approach to the public; (5) how to select arguments and illustrations; (6) how to prepare and circulate the material for effective publicity; (7) the campaign under way; (8) examples of good publicity material used in successful campaigns for better school support.

The subject of each chapter is admirably and discriminately treated. The first chapter lays the foundation for the following chapters by presenting arguments that seem to show conclusively "that permanent adequate support for schools is not to be had in a district unless the school policy is made clear to the voters and approved by them from time to time." The importance of the publicity campaign for increased funds for school buildings or for maintenance as needs arise is clearly presented. Possibly this presentation might have been strengthened had it endeavored to show the value of a continuing publicity campaign to keep the people acquainted with the work of the schools, the improvements made or needed in the curriculum, and in the administration of the schools. Such a continuing campaign to have the public know *their* schools and other schools would lighten the work of the special campaign for more money and do much to insure its success.

The conclusion of the first chapter may perhaps be summed up in the simple statement by the authors that "there is probably not one school system in a hundred where the people can be induced to vote increased taxes for

the amount needed at the present time without a well-directed and vigorous campaign of publicity."

The remainder of the book undertakes to tell how to organize the campaign and furnishes much concrete material illustrating what and how necessary information and arguments may be presented to the public effectively.

The suggestions for organizing and training groups of individuals for special work outlined by the campaign managers, and for securing in as large measure as possible the cooperation of existing organizations are excellent. It is not to be expected that all of the suggestions and recommendations for carrying on the publicity campaigns will be adopted in any one campaign. It is evidently the idea of the authors to present material and modes of procedure from which selections may be made to suit individual cases and local conditions. It is probable that some of the suggestions would involve more detailed work than can be secured without too great expenditure of time and money. Enough practical and well considered matter is presented, however, to meet the needs of almost any community.

It is to be regretted that no consideration is given to the modes of financing the publicity campaigns. Chapter VIII gives a large amount of excellent illustrative matter which has been utilized in publicity campaigns in a number of cities and which may be readily adapted for use in other campaigns.

A well selected bibliography is given from which city superintendents or publicity campaign managers may secure valuable material to aid in organizing publicity campaigns for better school support. Every city superintendent in the United States would be benefited by a careful reading of this monograph.

L. D. HARVEY

*The Stout Institute*

BUSWELL, GUY THOMAS. *An experimental study of the eye-voice span in reading.* (Supplementary Educational Monographs No. 17) Chicago: The University of Chicago, 1920. XI + 105 pp.

This monograph gives a detailed account of a phase of reading ability which has been investigated only in a limited way by other experimenters. The problem is concerned with the length of the distance by which the eye leads the voice as oral reading proceeds. Elaborate apparatus which recorded both the voice and the movements of the eyes was used. The two forms of apparatus were so arranged that the two types of records could be synchronized. Thus it was possible to measure the distance between the voice and the fixations of the eyes. Elementary and high-school pupils as well as college students were used as subjects. The data are set forth clearly by means of plates, tables, and graphs. The entire study shows very careful and painstaking work on the part of the author. Only one criticism of the technique of the investigation occurs to the reviewer. This has to do with the location of the voice in the reading matter. The writer's experience with this problem has been that it is very difficult to determine the exact location of the voice by listening to the dictaphone records. The importance of the investigation would seem to warrant the use of methods which would allow the location of the voice in the

same accurate way the eye-fixations are located. However, this point does not in any way destroy the value of the results.

The conclusion is reached that a wide eye-voice span occurs in common with a good quality of reading, a rapid rate of reading, and a small number of eye fixations per line. The author emphasizes that these factors are phases of efficient, mature reading, and that therefore the development of the eye-voice span should receive attention in the methods of teaching reading.

Another important point in the discussion is the tracing of the development of the reading habit through three successive stages. First, there is a stage in oral reading where the eye, the voice, and the meaning are all focused at the same point. Second, there is a stage of oral reading characterized by a considerable distance span between the eye and the voice. During this stage the meaning occurs at a point near the fixation of the eye. Third, there is the stage of silent reading where the voice drops out of consideration, and the entire attention is given to meaning.

It is hardly necessary to say that this monograph makes a very valuable contribution to the psychology of reading, and is of interest to all students of this subject.

C. T. GRAY

*University of Texas*

## News Items and Communications

This department will contain news items regarding research workers and their activities. It will also serve as a clearing house for more formal communications on similar topics, preferably of not more than five hundred words. These communications will be printed over the signatures of the authors. Address all correspondence concerning this department to Doctor E. J. Ashbaugh, Ohio State University, Columbus, Ohio.

E. D. Wolfe, Principal, Junior High School, Ashland, Ohio, reports an inter-grade contest this year in attendance and in spelling, in both of which satisfactory progress has been noted.

Supt. J. D. Sweeney, Red Bluff, California, sections his pupils of the fifth to eighth grades inclusive, on the basis of intelligence tests, placing approximately the better  $\frac{3}{4}$  in one section, and the poorer  $\frac{1}{4}$  in the other. The success of the grouping will be checked by means of achievement tests.

Professor J. W. Barton, Associate Professor of Psychology in the School of Education of the University of Idaho, has been promoted to a full professorship in Psychology. Mr. C. W. Chenoweth (M.A., Harvard), has been elected Associate Professor in Philosophy in the same institution.

Of the 342 pupils in the Parker All-Freshmen High School of Dayton, Ohio, 302 have no regular employment outside of school. 321 expect to graduate from high school, and 211 expect to go to college, according to a report from Principal A. E. Mayett.

H. E. Dening, Manchester, Ohio, reports a school band of approximately 50 pieces, in a school with only 100 children in the high school, and 350 in the grades. Though the band has been in existence only a little more than a year, it has made a sufficient reputation for itself to be invited to play at the State Fair this year. The youngest member is a fourth grader, 9 years old.

Green Bay, Wisconsin, is erecting a high school building, which will cost about \$750,000. It is intended to house one thousand children. A 23 acre site has been secured which will furnish ample space for recreation with separate playgrounds for boys and girls. Separate gyms for boys and girls, shops for Vocational Instruction, and the power plant will all be outside the main building.

Nelsonville (Ohio) reports a high-school enrollment of 12 percent over last year, and more than 60 percent over 1913-14.

At the November election 100,000 dollars worth of bonds were voted for the repair of the old buildings and the erection of a junior high school. Success in this issue, as well as general progressiveness in different features of school work is attributed in part, at least, to very live parent teachers associations in each of the elementary schools.

We have just received from the Oregon State Department of Education a 1922 bulletin on the Club Work of Oregon Boys and Girls. The foreword perhaps best explains the contents of the bulletin: "This little book contains the stories of achievement by boys and girls in the Oregon schools, who triumphed over difficulties in completing an industrial project." The bulletin is copiously illustrated and contains much material that will be an inspiration to other boys and girls of the state.

Superintendent E. W. Small, Warehouse Point, Connecticut, has furnished us with blanks which his teachers are using in hygiene reports this year. Heads, Hands and Nails, Face, Teeth, and Neatness are the items considered. A record is kept by the teacher of the number of children receiving credits or demerits both forenoon and afternoon each week. Special demerits are given for coughing or sneezing without protecting others, while special credits are given for treatment of eyes, tonsils, and adenoids. A banner goes to the room with the best report.

Second District No. 3, Colorado, fifteen miles wide and twenty-five miles long, includes the city of Fort Morgan and twenty-five rural schools. The district is under one superintendent, but the Board this year has employed a rural supervisor to have sole charge of the rural teachers. Every effort is being made to bring the standard of these rural schools up to that of the city. Intelligence and achievement tests are being used as means to this end. Isaac Stutsman is the superintendent, and Miss Florence Arbuthnot is rural supervisor.

The Department of Classical Languages at Ohio University (Athens) issues a monthly mimeographed bulletin of Latin News and Notes. The purpose is to assist teachers of Latin in finding material of interest to their classes, and to keep them fully informed of the latest movements in their field.

On the basis of seventeen Ohio schools, for which reports were available for both total enrollment and enrollment in Latin for the years 1919-20 and 1921-22, a notable increase in the proportion of the children studying Latin is shown. Of the total enrollment in these schools, 34.2 percent were studying Latin in 1919-20 and 42.4 percent in 1921-22.

Principal E. A. Ross of the Britannia School, St. James, Manitoba, has been applying some of our standardized tests. The results in both grades 5 and 6 on the Monroe's Diagnostic Arithmetic show our Canadian cousins above standard in practically every case. On Monroe's Reading the rate was slightly above standard, and comprehension slightly below. The results on the Monroe

and Buckingham Reasoning Arithmetic Tests were also slightly below standard. Mr. Ross says, "Of course the results are not up to American standards but this is the first time we have ever tested with anything of that nature and I am looking for a better showing when I give it again." We shall look forward with great interest to a later report from Mr. Ross, regarding the results of the second test.

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An analyzed rating of fitness for graduate study from "An Open Letter to College Seniors, by Dr. Carl E. Seashore, Chairman, National Research Council" designates the following characteristics upon which one might be rated: reasoning power, originality, memory, alertness, accuracy, application, cooperation, moral attitude, health, zeal for investigation. He who on an honest self examination does not believe himself to rank high on these items may question the advisability of the expenditure of much time or money on graduate work.

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The Los Angeles (California) High School Research Bulletin for February 27 lists the following eight journals as being the most representative periodicals dealing with educational research: Journal of Educational Research, Journal of Educational Psychology, School Review, Elementary School Journal, Teachers' College Record, Educational Administration and Supervision, American School Board Journal, and School and Society.

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Miss Mary B. Cummings, Director of Department of Research, Fresno, California, reports that one of the most notable things accomplished in their school in the past year is the organization of their intermediate schools.

These intermediate schools are not junior high schools in the general sense of the word; rather, they are designed to care for children of twelve years of age or over who for any reason find themselves behind pupils of their own age. These schools offer the same courses in agriculture, shop, home economics, physical education, music, and the like that are given in the junior high schools, but offer no courses in foreign languages. They give special opportunities for more rapid progress in English. The schools have no grade designation. Children of foreign birth, or of migratory parentage, form the larger proportion of the children in these schools.

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The Plattsburg program is an evidence that educational measurement is believed in extensively in New York state. The Plattsburg Teachers Association voted to use standard educational and intelligence tests as a means of studying their own work. After some correspondence with Mr. J. Cayce Morrison, specialist in educational measurements in the state department, the following program was decided upon: Terman Group Test of Mental Ability, all pupils, grades 9-12; Thorndike-McCall Silent Reading Test; Clapp's Standard School Tests in Correct English; Kirby Grammar Tests; Hudelson's English Composition Scale; Lewis Scale for Measuring Quality of Letters of Application; Henmon Latin Vocabulary and Sentence Tests; Hotz First Year Algebra Scales, Series B, Equation and Formula, and Addition and Subtraction; Min-

nick Geometry Test, Scale B; Rogers Tests for Diagnosing Mathematical Ability; Cleveland Survey Arithmetic Tests; Thurstone Clerical Examination; Van Wagenen American History Scales. This is the most extensive Measurement program in high-school grades, which has come to our attention. We hope for a later report from Plattsburg regarding the readjustment made on the basis of the findings and the results obtained.

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A number of educational bills are before the New York Legislature; action may be taken before this appears in print. One bill provides for free text books, another for compulsory medical and dental instruction, a third requires a certificate of loyalty from teachers, and a fourth provides that a qualified teacher who is an alien may teach if application has been made for citizenship.

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"College and University Administration," announced for early publication under the editorship of Professor Ralph L. Power of the University of Southern California, will contain a chapter on The Bureau of Educational Research by Dr. B. R. Buckingham of Ohio State University.

Another volume on vocational guidance under the same editor will also be announced shortly. The chapter on Educational Research will be written by Dean M. E. Haggerty, of the School of Education, University of Minnesota.

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Superintendent W. E. Lutz, Morenci, Arizona, indicates the interest which the School Board of that district has in the play-ground movement by requiring prospective teachers when applying for positions in the schools to answer the following questions:

1. Are you interested in the play-ground movement?
2. How much do you enter into the play of your pupils?
3. If employed here, do you agree to take an active part in the play of your pupils?

He also reports a new building in which stairways have been completely eliminated and which contains a combination stage-gymnasium forty by eighty feet. Superintendents who are forced to build under restricted financial conditions might do well to get in touch with Superintendent Lutz or call the attention of the architects who are planning buildings for them to the possibility of such a combination.

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Our attention has just been called to Series A, Form II, of the Douglas Standard Test for elementary algebra published by the Bureau of Educational Research, University of Washington. The test consists of four parts: addition and subtraction, multiplication, division, and simple equations. The same bureau has also brought out Form A of the Gregory-Spencer Geography Test for grades six, seven, and eight. This test consists of eight parts in an eight-page folder. Part I is trade routes and their products; Part II, miscellaneous geography; Parts III and IV, causal geography; Parts V and VI, place and descriptive geography; and Parts VII and VIII, political and place geography.

Superintendent David Gibbs, Meriden, Connecticut, has sent us two pages of mimeographed material on the subject of spelling which he has placed in the hands of his teachers. These take up such phases of work as: (1) the conditions upon which correct spelling may depend; (2) the elements which must be observed in effective teaching; (3) the manner of conducting the spelling lesson; (4) order of work; (5) reviews; etc. Much of the best that has been gathered from scientific experimental work in the subject is thus placed in the hands of his teachers and has doubtless been a real service to them. We shall be greatly interested in receiving any material which superintendents and supervisors are giving their teachers to assist them in their work. We would like especially to have material which is a compilation or a digest of the results of experimental work in the various school subjects.

#### Investigation in Visual Instruction

An investigation is under way to evaluate visual methods of instruction, particularly motion pictures, including a study of the types of lessons to which visual material is best adapted, and of the best mode of its organization. The first and simplest procedure is to run parallel classes in which the various visual methods are compared with one another or with the oral method. A comparison is being made of the efficiency of visual instruction in various subjects, or topics within a subject. The results which are coming in from this study indicate that a careful evaluation of the newer methods should precede an adoption of them since they may not be superior to older and simpler methods. In fact, they may in some cases be a distinct disadvantage. The analytical study of the methods by which visual material may best be organized to produce more effective results is probably the more valuable study. It is more difficult, however, and is at the present time not so far advanced as the evaluation of present material. Its purpose will be not merely to determine how good present materials are, but to point the way to development of better materials.

F. N. FREEMAN

*Chicago University*

#### Reclassification in Reading

In order to solve the reading problem in the Jefferson School where three rooms contained children from II-B to VI-B inclusive, it was decided to regroup on the basis of results of measurement with the Burgess Reading Scale. All children were given the test and the results scored in terms of the number of exercises correctly answered. The three rooms contained 96 pupils distributed as follows: room two, 33 pupils in grades II-B, II-A, and III-A; room three, 27 pupils in grades IV-B and IV-A; room four, 36 pupils in grades V-B, V-A, and VI-B. Seventeen of the children from rooms two and three scored zero while fourteen from the three rooms scored one. These thirty-one pupils were placed in first- and second-reader groups. The twelve children who made scores of two and three were placed together in a third-reader group. Twenty children from three rooms making scores of four, five, and six were placed in the fourth-reader group. Eighteen children, including representatives from three

grades making scores of seven, eight, and nine, were placed in the fifth-reader group and the remaining fifteen from rooms three and four made up a sixth-reader group. By arranging the schedule so that the reading period occurred simultaneously in the three rooms the children were accommodated by passing to the room in which a majority of the particular group was reciting. By this scheme each pupil took reading with the group with which he could work most satisfactorily. As a result each of these teachers is having two reading groups and yet we feel that the needs of the pupils are being taken care of quite satisfactorily. We shall be interested to see the results shown by another measurement at the end of the semester.

MYRTLE L. KAUFMANN

*Grade Supervisor, Logansport, Indiana*

#### Errors in Fundamentals of Arithmetic

We have recently received from Dr. Osburn, Director of Educational Measurements in the State Department of Public Instruction of Madison, Wisconsin, a report on the study of errors in the fundamentals of arithmetic. The study is based on the report of tests given to over 21,000 children in grades three to eight. Roughly two-thirds of all children made errors. The distribution is somewhat irregular through the grades, the greatest percent (81) being made by the fourth grade, and the lowest (57) by the sixth grade.

Typically wrong answers occurred in practically all grades and many of them point clearly to the incorrect mental activity. For example, 90 as the answer for the sum of 70 and 29 indicates that some children get zero as the sum of nine and zero. In handling denominative numbers, it is evident that in many cases they were treated as abstract numbers. The following percents are significant and it will certainly be worth while for teachers to check roughly their own classes to ascertain what members are perhaps making the same type of errors. In addition 18.3 percent failed to reduce the answer to proper terms; 11.1 percent added the numerator of fractions for a new numerator and the denominator for a new denominator; 8.2 percent failed to carry; 3.0 percent failed to use the decimal point in subtraction; 15.7 percent failed to pay back where there had been a case of borrowing; 10.4 percent failed in decimal fractions by writing the apparently smaller number under the apparently larger one; 9.1 percent treated denominative numbers as abstract numbers; 9.8 percent reversed the subtraction, for example, eight from eleven gave seventeen. In multiplication 11.3 percent of the errors were due to failure to place the decimal point; 9.8 percent due to failure to multiply by the fractional part of the mixed number; 5.5 percent are the type  $A \times 0 = A$ . In division, 7.2 percent were due to subtraction instead of division—apparently a failure to observe the sign which was given.

The following quotation from the report summarizes the situation: "Since all the studies point so clearly to the same set type of errors it is evident that those who would improve the achievement of their pupils in the fundamentals of arithmetic should provide an abundance of suitable drill for these special difficulties. The following points are particularly worthy of notice. The comparisons of numbers above the 5's are more difficult than those

below. Comparisons in addition whose sum exceeds ten are generally more difficult than those whose sum is less than ten. Carrying and particularly borrowing are difficult. Zero combinations are troublesome in all grades. In division a number divided by itself is often mixed. In fractions children are very apt to confuse multiplication and division with addition and subtraction. The results of the test point conclusively to the fact that more attention should be given to denominate numbers."

#### Rural Education in Pennsylvania

From 1900 to 1919 inclusive 722 one-room schools in this state were closed, generally by annexing one district to another. It was a process of consolidation but not a very effective one. During the past two years 1043 one-room schools have been closed through a more effective system of consolidation.

The Bureau of Rural Education was organized to effect consolidations wherever possible and to administer to every need of rural education. We shall always have a large number of one-room schools in a state like Pennsylvania for in some of the mountainous regions the topography of the country, the climate, the sparsity of population, the highways, etc. are obstacles to consolidation. In such places we shall continue to maintain one-room schools. It is our plan, however, to make them the best schools of that type. Our Rural Education Bureau is preaching the gospel of consolidation and showing to the people how improved buildings, equipment, properly trained teachers, and adequate courses of study contribute to the improvement of rural life and to agricultural interests. We are putting the question of consolidation squarely before the communities which are interested. We are not saying to a single community that it must consolidate its schools. We are pointing out the advantages that come to rural life through consolidation and the better schools afforded thereby. In several communities we have been able to effect consolidations which will enable the communities to maintain a six-year elementary course, a three-year junior high school course, and a three-year senior high school course. In addition thereto, special teachers of art, music, health, home economics, and agriculture are provided. We are trying to show the people of these communities how the school can be made a contributing agency to the home and how the home may be advantageously connected with the school.

In many cases consolidated schools may be maintained at less expense than the one-room schools; in many other cases the expense of maintenance will be more. Whatever the facts may be, they are set before the people who are then left to determine for themselves whether or not they want the modern type of school.

As a result of this kind of program in connection with rural education, we have been able to establish 128 consolidated schools in the last year and a half.

Representatives of our Rural Education Bureau attend all public meetings which may serve the community interests, such as community meetings, the Grange, parent-teachers' associations, mothers' clubs, federated clubs, farmers' institutes, commencements, special school gatherings, and meetings of school directors. The staff of our Rural Education Bureau will aid any community

in the establishment of parent-teachers' associations and other community enterprises.

THOMAS E. FINEGAN

*State Supt. of Public Instruction*

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#### A Problem Test in Geography

(A preliminary statement)

Although the main function of a geography test is to measure the ability of the pupil, it is quite possible that the test may also influence the teaching of the subject. If a teacher is constantly having her work measured by location tests, she will undoubtedly be led to over-emphasize place geography and to neglect the more important geographical relationships.

Modern teaching of geography emphasizes the study of problems in human relationships. The new Detroit course of study in geography gives a series of problems for each of the important countries. For example, when South America is studied, one of the problems for study is: "We should establish close trade relations with South America. Why?" References are given to textbooks and the children are given an opportunity to find answers.

The following test, which is called "Best Reasons," has been devised to measure the ability of the pupil to make judgments on geographical data. The exercises given here are mostly limited to physical geography, but they indicate the possibility of measuring this sort of ability.

In May, 1921, the ten exercises below, together with twenty others, were given to 2,921 children of grades two to eight inclusive in four different cities. First the children did a trial test consisting of three exercises, and then they did the real test. Essentially the directions were: "Put a cross in the parentheses in front of the best reason or cause in each exercise. You will have plenty of time to finish as many as you can do."

#### TEN SELECTED EXERCISES

(Make a cross in the parentheses before the best reason or cause in each exercise.)

1. Tides are caused by:  
() 1. Movement of ocean currents.  
() 2. The seasons of the year.  
() 3. The attraction of the moon and sun on different parts of the earth.  
() 4. The inclination of the earth's axis at an angle of 23½ degrees.
2. It may snow at the top of a mountain and rain in the valley because:  
() 1. The high mountains are covered with snow.  
() 2. It is colder at high altitudes.  
() 3. The people in the valley would rather have rain.  
() 4. The air is denser on the mountain top.
3. The temperature is hot at the equator because:  
() 1. The rays of the sun are more nearly vertical at the equator than elsewhere.  
() 2. The days are longer than the nights at the equator.  
() 3. There are few high mountains near the equator.  
() 4. Very little snow falls at the equator.

4. Ireland is known as the Emerald Isle because:  
( ) 1. The dry ocean breeze keeps it so warm.  
( ) 2. Many emerald mines are in Ireland.  
( ) 3. Ireland has much sunshine.  
( ) 4. Warm rains keep the vegetation green throughout the year.

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5. In the United States the days are longer in June than in December because:  
( ) 1. The earth is nearer the sun at this time.  
( ) 2. The earth rotates faster at the equator than at the poles.  
( ) 3. The vertical rays of the sun are farther north in June than in December.  
( ) 4. The rotation of the earth is very slow in June.

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6. Nevada has light rainfall because:  
( ) 1. The climate in Nevada is too warm.  
( ) 2. There are many deserts in Nevada.  
( ) 3. The crops can be cared for by irrigation.  
( ) 4. The moisture is lost before the winds cross the mountains.

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7. Isotherms are more nearly parallel in the Southern Hemisphere than in the Northern Hemisphere because:  
( ) 1. It is warmer in the Southern Hemisphere than in the Northern Hemisphere.  
( ) 2. There is less rainfall in the Southern Hemisphere.  
( ) 3. The Southern Hemisphere is mostly water and therefore has a more constant temperature.  
( ) 4. The days are longer than the nights in the Southern Hemisphere.

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8. The air in a heated room is always warmer at the ceiling because:  
( ) 1. In very high altitudes the air is light.  
( ) 2. Warm air holds more moisture than cold air.  
( ) 3. Cool air becomes dry when heated.  
( ) 4. Warm air is lighter than cold air and therefore rises.

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9. The irregular coast of southern Florida is due to:  
( ) 1. The shifting of sand.  
( ) 2. Volcanic eruptions.  
( ) 3. The work of coral polyps.  
( ) 4. Sinking of the coast line.

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10. Switzerland is called the playground of Europe because:  
( ) 1. The Swiss do not work.  
( ) 2. Switzerland is so small.  
( ) 3. Switzerland has a small standing army.  
( ) 4. People of all nations spend their vacations there.

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Table I gives the percent of correct responses for the different exercises in grades five, six, seven, and eight. For example, the first line of the table gives the percent of correct responses for the first exercise (Tides are caused by, etc.). This exercise was answered correctly by 19 percent of the pupils in the fifth grade, by 25.5 percent in the sixth grade, by 32.5 percent in the seventh grade, and my 41.5 percent in the eighth grade. The last line of the table gives the number of pupils participating in each of the grades. A

study of the table will show that there was an increase in the percent of correct responses in each successive grade on all exercises except number nine upon which the percent was the same in grades seven and eight. This indicates that the judgment and information of the pupils increased with school experience.

TABLE I.  
PERCENT OF CORRECT RESPONSES TO CERTAIN EXERCISES IN  
THE "BEST REASONS" TEST IN GEOGRAPHY

Number of Exercise	Percent of Pupils Making Correct Responses			
	Grade V	Grade VI	Grade VII	Grade VIII
1	19	25.5	32.5	41.5
2	39	55	65.5	74
3	70.5	82.5	87	92
4	27	39	44	51.5
5	26.5	27	40.5	45.5
6	43.5	62.5	77.5	78.5
7	25	30	41.5	54
8	58	64	71	84.5
9	11	17	19	19
10	51.5	52	66	71.5
Total Number of Pupils	585	910	925	501

The average geography teacher will no doubt think that a better method of obtaining answers to a question as to why Nevada has a light rainfall is to allow the pupils to write their own answers. The scoring of these answers, however, is almost impossible. Anyone who has attempted to score such questions as those given in the Hahn-Lackey scale will be convinced that this is true. Perhaps the Best Reasons test does not allow for the initiative of the very brightest pupils in stating reasons, but it does permit an absolutely objective method of scoring.

It is quite possible that some of the exercises of this test are not highly important. However, the method used can be adapted to questions, the answers to which children of the elementary school should know. The following questions, which are more definitely concerned with human relationships than those given above, are suggestive of additional exercises for use in such a test:

1. Why has the growth of Chicago been so phenomenal?
2. Why are the Southern States and New England States dependent upon each other?

3. Why will the industries of France be greatly aided by the return of Alsace-Lorraine?
4. Why is great care being taken in the construction of buildings in San Francisco?
5. Why is the production of motion pictures an important industry in Southern California?
6. Why do baseball teams have their early spring training in cities like Atlanta, Georgia?
7. Why has Switzerland been able to maintain its independence for so many years?
8. Why is India a very important possession of the British Empire?
9. Why is the Panama Canal of great advantage to New Orleans?
10. Why are there so many small nations in Europe?

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# Educational Research Association

(FRANK N. FREEMAN, *Secretary and Editor*)

## NINETEEN TWENTY-TWO MEETING FEBRUARY 28 TO MARCH 2, 1922

The Eighth Annual Meeting of the National Association of Directors of Educational Research was the largest in the history of the association; largest in the number of members attending, largest in the extent of the program, and largest in the total number of persons who were attracted to the programs. As has been true for several years, the room allotted us for the open meetings was too small to seat the number of persons who wished to profit by the reports made. That the papers were both interesting and valuable was perhaps best attested by the extent to which both men and women stood attentively during their presentation.

### THE OPEN MEETINGS

The program on Tuesday afternoon was equally divided between reading and general intelligence work. Doctor A. I. Gates of Teachers College, Columbia, reported a study, highly analytical in character, of reading and spelling with special reference to disability, showing how such a careful study was of value to the teacher in discovering the difficulties of individuals and in enabling her to apply remedial work more effectively. Doctor C. T. Gray of the University of Texas reported on the anticipation of meaning as a phase of reading ability. The working out of the problem involved the devising of a considerable amount of laboratory apparatus and was of a nature quite impossible for use in the classroom. However, the results secured should be utilized by the classroom teacher, and we shall await the publication of the paper with a great deal of interest. The paper by Doctor G. T. Buswell of the University of Chicago was another of the highly technical papers of the conference. While it is useless to try to give a synopsis in this brief report, the work of which his paper gave but part, gives promise of a series of scales to be used by the teacher in the development of certain types of reading habits.

Assistant Superintendent Dawson's report on classifying kindergarten children by means of the Binet test and Mr. Kallom's on intelligence and the classroom teacher were concrete examples of the practical use of intelligence tests. The large number of superintendents who heard these papers should have been encouraged to do such work if they had not already tried it. Doctor Franzen of the Des Moines (Iowa) public schools presented the results of an extensive study of intercorrelation of some fifteen intelligence tests, seeking to determine their relative validity and thus point out to school people in general the tests from which the most reliable results might be expected. The conclusions seemed to point to the National Form B and the Terman Group as the best among the group tests now available.

Four of the six papers scheduled for Wednesday afternoon were on curriculum problems. Doctor Charters was unable to be present but his paper will appear in an early number of the Journal. Doctor Horn's paper on comparison of reading, writing, and pre-school spoken vocabularies emphasized the fact that researches had shown a great similarity between these vocabularies; that they were much larger than ordinarily conceived, but that one's guess as to whether a particular word would be found among those of any one list was very likely to be wrong. Doctor Caldwell presented the work that he and his colleagues are doing at the Lincoln School in music and biology in sufficient detail to make clear that a curriculum scientifically built upon social needs is a task of great proportions. Miss Zirbes in discussing the relationship of measurement to pupil progress and curriculum research in reading, called pointed attention to the fact that there was real need for measurement to assure progress when the materials of instruction were being experimentally determined.

The other two papers were of a very different type, though no less scientific. Miss Schmitt presented a careful analytical paper on temperament and attitude as factors in school progress, portraying the different types of each and discussing the teacher problem in successfully handling each. Doctor Freeman spoke forcibly for research instead of propaganda in visual education and cautioned school men to look for the former and beware of the latter. He also pointed out the lines along which research promised definite results.

Since there was a vacant place on the program, Mr. Courtis who is always welcomed on our programs, was given an opportunity to present some material on individual work in primary reading. In his scheme, each child is given a specially prepared dictionary with which he works out the story in a little reader. It is an effort to enable each child to do his own work and progress at his own rate.

On Thursday afternoon, Dean Chadsey who had promised to preside was prevented from doing so by illness and President Rugg pressed Doctor Buckingham into service. The scheduled numbers of the program were all given except that by Mr. Packer, who was not present. Superintendent Washburne of Winnetka presented in some detail the individual instruction method which he is using and endeavored to show that the formulation of materials was the largest problem confronting those who really wished to care for individual differences. He paid his respects to the "socialized recitation" as follows: "We do not have socialized recitations because there isn't any such thing and can't be. If it is a recitation, it isn't social and if the activity is social, it isn't a recitation." Superintendent Washburne's paper was published in the last issue of this journal.

Doctor Knight of Iowa gave the paper which was published in the March number of this journal. Our readers are referred to it. Doctor Counts of Yale discussed the sociological character of the secondary-school population and showed that, while the schools are democratic in theory and support, they are not attended by children of all social groups in proportion to the number of children within those groups.

Doctor Strayer presented methods and problems of research in the field

of educational finance and forecast a great service to the schools of the nation as a result of the inquiry now under way. Doctor Cubberley presented phases of research in county and state school administration, sketching briefly the development of school administration in this country and pointing clearly to the next steps that must come.

#### THE MEETING THURSDAY EVENING

The last meeting of the association was the dinner which was held on Thursday evening. The solidarity and *esprit de corps* of the society is indicated by the fact that a large proportion of the members who were in attendance at the meetings stayed over for the dinner. Those who did attend were amply repaid by both the light and the heavy intellectual refreshments.

The light refreshments comprised a considerable amount of general chaffing and the presentation to the company of a new intelligence test and a new spelling test. We learned that, while one member bore the title of Head of the Bureau of Reference and Research, his duties seemed to have little to do with research (accent on the last syllable), and that another member, who bore the same title, confessed that he could offer no references. The president demonstrated a new intelligence test, the percentile value of which as estimated from the percentage of failure in the group would be about .99. Another member presented a spelling test of ten words and made a sporting proposition. The full details of this matter are reserved for publication in a monograph.

The business meeting was held during the course of the dinner. The following officers were elected: President, W. W. Theisen; Vice-president, E. J. Ashbaugh; Secretary-treasurer, Frank N. Freeman.

There was some discussion of the division in interest among the members of the association in the type of paper or discussion which should be presented at the meetings. This problem is somewhat akin to the question concerning the kind of articles which should be accepted for the Journal. The discussion brought out the fact that the problem both of the meetings and of the Journal involves the relation of the association to other associations of similar nature and purpose. In order that these questions might be thoroughly canvassed one committee was appointed to consider the journal problem and another to consider the meeting problem. Both committees are to report at the next meeting.

The executive committee is taking steps toward incorporation as directed by the association.

The constitution or by-laws or some resolution, I am not sure which, provides that the president shall deliver an address at each annual meeting in which he sums up the progress in educational research for the preceding year. The president gave us full measure this year by reviewing the entire modern scientific movement in education. He displayed on a large chart the various trends showing their origins and parallel chronological development. This chart went so far into detail as to give the names of representative workers in the various types of research such as the study of administrative problems, educational measurement, and the investigation of learning. The meeting unanimously requested Doctor Rugg to publish his chart in the Journal of Educational Research, which he plans to do.

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## ACTIVITY ANALYSIS AND CURRICULUM CONSTRUCTION<sup>1</sup>

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There are two clear-cut theories concerning the relation of the curriculum to the activities of the individual. (The theory upon which current curricula have usually been constructed maintains that the content of the curriculum should come from the specialist and be applied by the individual to the activities in which he engages after he has learned them.) The specialist in chemistry, for instance, constructs a course in that subject which presents the fundamental facts and principles of the science as the chemist uses them. The same material is taught to chemists, engineers, farmers, doctors, housekeepers, and laymen, with the expectation that each will apply such of it as he may need, to the activities of his vocation or of his leisure. The lexicographer selects the spelling list for the school and thereby specifies what he considers to be the fundamental spelling vocabulary. This list the individual learns and of it he uses those words which he may need in writing letters, articles, speeches, or reports. To these illustrations may be added the curricula in history, botany, zoology, physics, design, mathematics, grammar, sociology, and others. In all of them the theory of specialistic determination holds that the fundamental content of the subject taught in the school is determined by the specialist; and that the learner, after acquisition, uses what he needs.

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<sup>1</sup> A paper read at the meeting of Section Q, American Association for the Advancement of Science, Toronto, December, 1921.

(The other theory, which is the natural outgrowth of the theory of evolution, maintains that the content of a school subject is determined by the use to which it will be put. It quite willingly grants that the chemist shall determine the content of chemistry courses for prospective chemists but it emphatically maintains that the same right shall be granted for the use of the engineer, the doctor, the housekeeper, the farmer, and the layman.

The theory of evolution holds that a structure which functions successfully in one situation may be beneficially modified when placed in another situation. The supporters of the theory of activity analysis, to apply the parallel with evolution, hold that the situation of the specialist as described in terms of his activities, duties, and problems, is not identical with that of the engineer, the doctor, or the layman whose problems and duties are different and that, therefore, the structure of the curriculum may well be modified more successfully to cope with the differences of each.

But the method of activity analysis advances beyond the law of natural selection which operates rather blindly in the field of biological life in preserving useful accidental variations. A biological organism changes its structure through accidental variation so that when it comes into possession of characteristics which are of superior efficiency in controlling a type of situation in which it is placed, it tends to retain the useful modifications thus more or less accidentally thrust upon it. Rational beings, however, in developing social organisms, such as the curriculum is, can advance a step beyond the law of natural selection by first making an analysis of the situation to which adjustment is to be made and then developing an organism which meets these conditions in a superior way.

This is primarily what activity analysis attempts to do in the field of curriculum construction. The activities in connection with which a subject may be used are analyzed to discover exactly what the individual is to do and then the subject material necessary to assist in the performance of these activities is collected and organized. For instance, one situation in which the learner

finds himself is concerned with the communicating and recording of facts. Specifically, the laymen writes letters, and children compose original themes. To analyze this situation a count is made of words—in personal letters and in the writing of children. The lists so obtained become the spelling vocabulary for the elementary school, which is the school for laymen. For the spelling curriculum of the business college in which stenographers and typists are trained, the same method is used but applied to a different situation in which word counts of business letters are made. Arithmetic for the layman may be determined by a collection of arithmetical problems which the layman meets. Mathematics for chemists is determined by an investigation of the mathematics used by chemists. The chemistry used in food courses is obtained by derivation from the content of food courses. The grammar necessary for the correction of errors is secured after an analysis of grammatical errors of school children. The English composition needed by engineers is disclosed by an analysis of the uses to which engineers put the subject. The sociology needed by the layman is obtained by an examination of the social problems which confront the layman, just as the sociology needed by the sociologist is determined by the problems encountered in the field of sociology.

(In all cases the theory of activity analysis holds that the structure of a subject varies with its function and its content with its use) It leaves a place for the specialists' organization of the curriculum by allowing that the function of the subject for him is one of many functions while it opposes the claim that the structure which is best for the conditions of the specialist meets all other situations equally well.

The method of activity analysis is profoundly significant and is so incompletely understood that the writer has taken the liberty of presenting some of the problems which have to be met in its use. For clarity these will be listed and described as *dichotomous* situations in which the selection of one or another of pairs of considerations modify methods of analysis and of curriculum construction.

(Parenthetically, it may be said that an activity analysis is the analysis of both the mental and physical activities which are carried on by individuals.) Used in this broad sense, activities include not only what people do but what they think, and feel, or will. In its most complicated form, the analysis is concerned with a broad range of physical actions, feelings, and purposes, as in the analysis of the activities of women made for the purpose of constructing a college curriculum for women. In its simpler forms, it involves the analysis of definite operations, to which the term job analysis is applied, as in the analysis of the operations involved in running a machine. Between these two extremes are activities displaying all gradations of complexity and requiring all degrees of analytical ability.

The first dichotomous situation which causes a modification of methods is contained in the distinction between sequential and non-sequential activities. (By a sequential operation is meant one in which the constituent activities normally follow each other in regular order.) Most personal routine duties are of this sort, such as dressing in the morning and baking a cake, or as in machinery operations in production plants and the annual calendars of animal husbandry. Non-sequential activities, on the contrary, are arranged in no regular order in the performance of any operation.) Specifically, communication of ideas through spelling, writing, and language is non-sequential because there is no regular order observed in the occurrence of words or rules of syntax since their use is dependent upon the demands of varying situations. A job analysis of salesmanship, in which all the activities or duties are to be listed, is much more difficult than the job analysis of cabinet making. A job analysis of home making deals with duties some of which are routine and sequential but most of which are irregular and non-sequential in their appearance.

This leads to very marked differences in methods of analysis. For sequential jobs, the usual procedure followed by the job analyst is to obtain from each of several operators in separate interviews a list of his duties, to combine these, to resubmit the list to them, and to have it checked by the foreman. In non-

sequential jobs the same procedure is used as a basis but from knowledge born of experience, the analyst finds that he needs to make a supplementary analysis by long continued personal observation of the operations and in some cases by a long continued performance of the job. A case in point is that of the analysis of salesmanship which was made by us last year. Interviews were held with many salespeople for the purpose of obtaining a list of their difficulties; to this were added interviews with several managers and superintendents; but so little was obtained from these sources that a member of our staff with competent experience in selling, had to be detailed to watch salespeople at work daily for three months before we felt that we had a reasonably accurate list of the duties of retail selling. In other words, the analysis of non-sequential jobs is much more difficult than that of sequential activities and requires a more elaborate technique.

A second bifurcation of methods is necessary according as the analyst wishes to make an activity analysis or a difficulty analysis. (For instance, a spelling vocabulary based upon analysis may list either the words most frequently used in correspondence or those most frequently misspelled.) In the former case the top words are such as: *in, all, and, as, and for*. While in the latter the words which lead the list are: *separate, which, there, and their*.

While theoretically every learned activity at some time or another is a difficulty, with the result that eventually the two lists are identical, there are practical situations in which the activity analysis is not as efficient as the difficulty analysis. For in the first place, operators are often unable to report what they do because many of their duties have become submerged habits, while they may easily be able to recognize the duties with which they have difficulty because difficulties require the focusing of attention. In the second place, if the analysis is made after activities have been partially learned it is extremely important to know those with which the learner now has difficulty in order that special attention may be given to them. So, in the study

of language in the school, to which children come with some proficiency in speech, it is less important to know the rules they use than the rules they break. For practical purposes, in this case, it is unnecessary to teach them rules which they cannot break while obviously it is of first importance to teach them rules whose observance will eliminate error. When the operations have been carried along to a position of partial mastery, difficulty analysis becomes a necessary method in the construction of a training curriculum.

This is the fundamental position of Bobbitt in his theory of curriculum construction, though it can be demonstrated in opposition to this position that it will hold only where activities have been partially learned and is, therefore, not of sufficient breadth to determine all the activities which should be included in a school curriculum. These can be determined only by an activity analysis, to which a difficulty analysis is a necessary supplement in the later stages of learning.

A third distinction of sufficient importance to be mentioned is that between what may be called gross analysis and detailed analysis. (If the analysis is made sufficiently minute it is possible so objectively to determine the content of the curriculum that the work can be performed in the laboratory; but if the analysis ceases before working units are obtained, it becomes necessary to supplement the findings of the analyst by conference with faculty committees.) For instance, a study of the mathematics used in chemistry by Williams is carried to sufficient detail for not only the operations but their range of complexity to be determined with such exactness that a review course may be worked out in detail. At no point in the study is any item a matter of opinion. So, also, the spelling lists obtained by word counts are sufficiently detailed to establish objectively the actual content of the spelling curriculum. On the other hand, the job analysis made by Strong of the duties of executives, as the basis for a curriculum in commercial engineering, was so complicated and the pressure of time so great that only the broad outlines of the content of the derived courses could be determined, with the result that for the comple-

tion of the work committees of teachers of all subjects concerned become a necessary part of the method.

Gross analysis, then, is not so objective as detailed analysis, and requires the use of concensus and conference while a detailed analysis makes opinion an unnecessary part of the methods of curriculum construction. The goal of all curriculum construction is the elimination of as much of the subjective element as possible, though this cannot be entirely accomplished.

✓ A fourth distinction in the use of activity analysis arises from divergent uses of the analysis. The employment departments of commercial and industrial organizations make analyses to obtain job specifications while the training departments use them for curriculum content. For job specification, it is necessary to list only what is to be done by an operator in a specific position so that when the employment office is called upon to select a person for the position he will know the nature of the job. For curriculum construction, it is necessary to supplement this information about what is to be done with additional information as to how the operations are to be performed. For these reasons the job specification is much less detailed, and as a matter of fact it is usually found that the curriculum cannot be based upon the employment department's job specifications. New analyses have to be made by the training department with much greater attention to the details of the operations. Theoretically, the job specification is the proper basis for the training program; but because of these differences in function those job specifications found in employment offices will not usually suffice.

This leads naturally to a fifth distinction which may be stated in the form of a question. (Shall training departments teach the installed methods of job performance or the best methods?) The obvious alternative is the latter, but practical considerations may cause a change of opinion. For instance, if in the training of operatives in the correspondence division of a large department store the management asks the training department to make a change in the system as well, it is in effect asking it not only to teach but to reorganize. So, because of the expense and time

involved, it may be advisable for the training department to teach the imperfect installed procedure rather than to effect a more efficient procedure before the training program is begun. Yet, it may be said parenthetically, that in business the tendency is toward placing both training and organization on the shoulders of the training department, especially when a radical reorganization is not required.

Nor are the schools free from this problem. Superficially, it seems self-evident that only the best methods of performing activities should be taught in the school. But in practice it is often a question whether this is wise. Is it advisable, for example, to advocate the best methods of solving social and political problems (the best being determined by the judgment of conscientious teachers) if it is not practically possible to make the necessary reorganization of social institutions which will permit the most efficient methods to be used? In these difficult cases the wise teacher modifies his best in such a way as to make it the best possible under existing conditions and teaches his students the methods by which reorganization of social institutions may be effected. But in either case the curriculum is affected by the point of view which is chosen.

The sixth consideration is the distinction between ideals and activities. An activity analysis is not sufficient to determine the curriculum unless standards of performance are set up by which to make a selection of methods. This is done by the determination of ideals, which dominate the performance of the activities. This is recognized informally in the selection of men in business by the inclusion in the job specification of both the duties to be performed and the personal qualities desired. Some positions require courtesy, others demand scholarliness, and all require honesty and conscientiousness. So in building a curriculum it is necessary to determine both activities and ideals. For instance, a secretary may have the duties of answering the telephone and of meeting callers. These may be done in several ways but obviously the ideal of courtesy is so important that only courteous methods of answering the telephone and of meeting callers

will be selected. Merely to perform these duties, or to perform them with wrong ideals, will not lead to efficiency.

Consequently in school as in business the determination of standards in the guise of ideals is an essential part of all curriculum construction. So important is this procedure that faculties should conscientiously and reflectively determine the ideals whose stamp their graduates shall bear and then apply the appropriate ideals as standards for the selection of alternative methods of performance. Long and laborious as this procedure is, it is the only method by which the curriculum can be built or can be acquired. In all curriculum construction, the ideals must be determined before the methods for performing the activities obtained by analysis can be selected.

Of a somewhat different sort is the seventh bifurcation. This lies in the distinction between primary subjects and derived subjects. To clarify this distinction an illustration may be given. When in the major job analysis made by Strong the duties of the executives of certain industrial organizations had been ascertained and the information necessary to perform them had been listed, there was found to be a large amount of English, of psychology, and of economics, but only a very short list of the principles of physics. So far as the primary subjects, that is those discovered in the analysis, were concerned physics was judged to be relatively unimportant; but this did not mean that no other items of physics were necessary. For, when the primary subjects, such as mechanics, were examined, it was found that physical laws were necessary for their mastery. So, to obtain a full curriculum in physics it was necessary to list all the items of physics revealed in the primary analysis and to derive from the other subjects the additional items of physics necessary to understand them.

This means that the so called fundamental service subjects of mathematics, chemistry, physics, sociology, or history are essentially derived subjects rather than primary subjects revealed in the analysis. It may be said in passing that this explains in part the statement of professional men that they do not use their

fundamental subjects and explodes the claim sometimes made that because they do not use them, they should not learn them. For, obviously, at one time it was necessary for them to learn the fundamental subjects in order to understand methods which they now use; and it is legitimate to forget items once the basic use for them has ceased. However, this does not mean that the method of specialistic determination is to be followed. It is still necessary for the fundamental service subjects to be derived by activity analysis so as to include only what must be understood; but it is not a matter for alarm if later they are forgotten after use for them has disappeared.

(Finally, a distinction needs to be made between the vocational elements and the extra-vocational elements in the curriculum of the vocational school. The vocational portions of the curriculum can be obtained by the analysis of vocational activities and the material may be collected under the domination of selected ideals. But just as the doctor or the engineer is something more than a mere doctor or engineer because he has extra-vocational responsibilities and interest in his family, his friends, and his civic problems, so the curriculum of the vocational school must include more subject material than is obtained from a job analysis of the vocation.)

Two analyses are necessary, a vocational analysis and an extra-vocational analysis. The activities and interests of extra-vocational life, those problems and interests which all men have, irrespective of vocation, must be analyzed by the same methods as are used in the vocational analysis.

At present the extra-vocational content is determined negatively. A few hours are set aside in the course of study for so called cultural subjects and the selection of courses to fill them is largely left to chance. What we advocate is a positive approach to the question through an activity analysis of extra-vocational life from which can be definitely determined what will be of most use for the individual in furthering those interests and needs which are not directly connected with the vocation.

Other considerations might be presented to illustrate the problems of curriculum construction but enough have been mentioned to show the possibilities and the difficulties of activity analysis.

(In conclusion, the foregoing considerations demand that when activities are analyzed, ideals and standards must be set up to aid in the selection of subject material; that in analyzing activities, difficulty analyses may supplement activity analyses; and that in all cases the analysis should be as detailed as possible in order to secure the largest measure of scientific objectivity. Non-sequential jobs are difficult of analysis but the task is neither impossible nor impractical. The content of subjects may be of direct use in activities or may be derived from subjects which are of direct use, as the basis upon which they rest. Finally all courses of study in vocational schools must include not only vocational but also extra-vocational content, both obtained by the analysis of activities—the former by an analysis of the vocation and the latter by an analysis of extra-vocational life.)

## THE EFFECTS OF SUPERVISED STUDY IN ENGLISH COMPOSITION

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Teaching children how to study has come to be considered one of the important ends in the educative process. It has taken its place by the side of useful information, skills, ideals, attitudes, and prejudices, as deserving of the efforts of the teacher. We have learned in our elementary and high schools, as in our best graduate and technical schools, that the test applied to the learner should not be merely, "What does he know?" but rather, "What can he do independently of the teacher?"

Various plans have been devised for the purpose of teaching children to study. The present investigation concerns itself with the efficiency of the so called divided or double-period plan, by which the first half of a period is given to class discussion and assignment while the second half is given to supervising the work of children upon the new assignment. The modification used in this experiment consisted in the fact that the teacher did not definitely adhere to so rigid a division of time for recitation and study purposes respectively, but called children to a class discussion whenever there was something worth while to discuss, and permitted them to work or study the remainder of the time.

Many claims have been made for the efficacy of the double period plan. Some of these are probably well founded, others are not, for in some instances the judgments are based upon careful investigations; in other cases the opinion of teacher or superintendent is regarded as sufficient proof of the efficacy of the plan. One of the more recent investigations of the problem of supervised study in the divided- or double-period plan was made by Professor Breed of the University of Chicago and others, under the auspices of The Michigan School Masters' Club. Professor Breed investigated the effect of supervised study "when carried

on by this plan under actual school conditions in thirteen high schools of Michigan and one of Minnesota with the aim of throwing additional light on the effectiveness of a common form of organization of supervised study." Breed's conclusions are stated by him as follows:

"1. On the basis of average results for whole classes, supervised study of the type tested was slightly less efficient in first-year algebra, and much less efficient in ninth-grade composition, and was more efficient in first-year Latin, than non-supervision.

"2. Supervised study of the kind tested facilitated the progress of the poorer pupils, and to a correspondingly greater degree retarded the progress of the better pupils.

"3. The divided- and double-period plans should not be urged for general adoption in secondary schools until their efficiency is more clearly demonstrated.

"4. Until the divided- and double-period plans meet the objections urged against them, a selective or differential plan of study-supervision should be favored by secondary schools, that is, a plan which concentrates upon pupils of less ability.

"5. The technique of supervising the study of the poorer pupils needs to be improved; a technique of supervising the study of brighter pupils needs to be developed."

It seemed to the writer, however, that Breed's method of procedure was open to objection in some particulars. Classes were divided upon the basis of previous attainments in English composition as indicated by teacher's grades (semester) and a preliminary test. Under such a plan it was impossible to make allowance for the very capable child who writes a rather poor composition and the slow, plodding child who, because of very constant application has succeeded in attaining a comparatively high score but whose further progress is limited by his lack of capacity. Again the basis of Breed's statistics are teachers' marks unaided by any scales. It would seem that the rating of the papers could have been materially improved by means of one of the several composition meters now available. In the third place it would seem that little was done in this investigation

to apprise the teachers participating of the real significance of supervised study. To be sure the teachers were referred to Whipple's Manual, but this very reference implied a misconception of the problem involved in teaching children how to work more intelligently on their compositions, as will be shown later, and the teachers could receive but little assistance upon a point on which it was most needed to make the investigation a success. Breed agrees with Parker when he holds that the poor students appear to profit most from supervised study and the bright pupils are actually retarded by this method. However, it seemed to the writer that a capable teacher who studies the special needs of the bright child must be able to teach him better methods of work; if she cannot, why should such children be required to attend class exercises at all the very purpose of which always is to teach better methods of work? It would seem that the loss of the bright child in the supervised study period is to be accounted for rather by the inability of the teacher to understand his needs and therefore to deal with him intelligently.

The object of the present investigation was to ascertain (1) whether supervised study in English composition under the divided-period plan or its modifications, when the teacher knows the technique of directing study in this subject, that is, when she knows what to do with the children of varying ability in order to improve their methods of writing compositions, whether such a plan is less efficient than unsupervised study of this subject; (2) whether the poorer pupils necessarily profit most from supervised study and the brighter pupils not only profit less but are actually suffering from the interference resulting from supervised study; (3) what are the best methods of teaching children to improve their methods of work in writing English compositions?

This experiment was conducted with the ninth grade of the William McGuffey High School at Miami University. The National Intelligence Test had been given at the beginning of the year. The coefficient of brightness was computed for each child. The entire class was also given two preliminary tests in compo-

sition writing to ascertain the initial attainments of each pupil. The papers were rated by means of the Thorndike-Hilligas scale. The class was then divided into two groups each of seventeen pupils of approximately equal ability, constituted as follows:

The supervised group had coefficients of brightness totaling 1766 points and composition scores totalling 938.4 points; the unsupervised group had coefficients of brightness totalling 1707 points and composition scores totalling 990.8 points. The advantage in intelligence, therefore seemed to be slightly in favor of the supervised group while the unsupervised group had the advantage in initial attainments in composition writing.

The two groups were taught by the same teacher, Miss Marguerite Royal, staff teacher of English. Each group worked for twenty-five periods of one hour each. Of these periods seven were given during December and January 1920-1921, one period a week; eighteen were given during April and May, 1921, the two groups alternating from day to day. Illness of the teacher interrupted the experiment during February and March. The writer assisted the class teacher in directing the work of the supervised group, primarily for the purpose of developing a method of procedure; the teacher, however, had charge of the recitation in the supervised as in the unsupervised class. In both groups, the teacher attempted to arouse as much enthusiasm for the work as possible in order that every child might do his best. In this she succeeded for we never had keener interest in the writing of compositions.

Our principal task was to devise a method of procedure for directing the work. We decided first of all, to attack the more fundamental aspects of composition writing, how to choose the subject for a composition, how to plan the materials to be used in the development of the subject, how to arrange these materials, what an outline is for, and how to word it and use it. The chief emphasis throughout was placed upon having something to say and saying it in such a way that it would be clear and interesting to an audience. Occasionally a half hour was set aside for the purpose of enjoying the stories written. In order to teach chil-

dren to be more successful in criticising their own productions they were encouraged, first, to go over their compositions in the light of the principles they had been taught, and second, to meet with one or two of their classmates for the purpose of going over their compositions.

The various phases of composition writing were then further analysed, with a view of showing the best methods of procedure of the skilled writers. The effects of this analysis were (1) to make the teacher conscious of the factors in good methods of writing, and (2), as a result of (1), to devote herself more to the process of children's writing rather than the product.

Let me give an illustration to show how we attempted to meet the needs of the individual children in the supervised group. One of the boys chose as his subject "Mischievous Billy." Although he had been taught how to make an outline, there was nothing in his outline to indicate what he planned to say. When asked he said, "I am going to tell how Billy went up town and a lady asked him, 'How do you do Billy,' and Billy said, 'I do as I please.' When the writer objected that this would not do, the boy said that he did not know what else to write. When asked he replied that he had had no one in mind when he chose his subject.

Further questioning brought out the fact that there was a little boy in his neighborhood, who might well be called "Mischievous Billy." This little fellow had visited the yard of the pupil where he had found a coaster wagon and a can of paint; he had proceeded to paint the wagon and had gotten considerable paint on himself. The boy was asked whether he knew another escapade of this little fellow. It happened that this small boy had had some difficulty with children in an adjoining block. The older children took up the fight and punished him by throwing a basin of water on him. The pupil agreed that this would make another good incident for a story about Mischievous Billy. He was then led to recall an incident in which he and his brother were the actors, an incident that might well be added to this story. These two boys had a bantam rooster, a rather troublesome animal

to members of the family and the neighborhood. One morning they tied a tin can to the rooster's tail. The immediate results convulsed with laughter both the boys and other members of the family. The boy thought this incident would do very well for his story. He was then asked to make out an outline. This is his outline: 1. Billy has some fun with a rooster. 2. Billy paints a wagon but also himself. 3. Billy receives a bath. 4. Billy has a settlement with his mother. Next came the writing of the story. The boy showed that further development of the incidents was necessary, because he was too much inclined to state mere facts and did not appreciate the value of interesting details. He was then requested to imagine the various things that might have happened in the incident with the rooster (he had rather completely forgotten them); these he was asked to state orally first. Occasionally the writer offered suggestions, some were received gladly, others were rejected; in no case were they forced upon the boy. When the incidents had been thought through in this detailed fashion, the boy seemed ready to write. Another difficulty now manifested itself. Since he had never taken any interest in composition work he had a rather meager vocabulary. Suitable modes of expressions had to be sought; but after consideration of a number of expressions he had used, he began to attend to this matter upon his own responsibility. Here is the first paragraph from this boy's final test composition. "It was one dismally sultry, rainy day last summer in Wisconsin. It has been raining hard all the night before and of course everything was covered with water. The roads were bad all around the hill but none as bad as the newly made dirt road coming down the hill." This paragraph still is faulty in some respects but it does show a very definite attempt to choose words which are adequate to the ideas to be conveyed, and is immeasurably better than this boy's work six weeks previous. Limitations of space prevent the giving of other illustrations.

Two tests were given to ascertain the improvement which the children had made during the period of the experiment. A list of varied subjects was given the children to choose from and an

hour was given them in which to prepare and write their papers. The pupils were permitted to choose their subjects in advance of the day on which the final test was written. This was done in order to give them a better opportunity to plan their compositions but there was little evidence that the children availed themselves of this opportunity. When the papers had been written, they were numbered according to a scheme which concealed the identity of the writers. The papers of the supervised group were collected with those of the unsupervised group and rated with the Thorndike-Hillegas scale by the staff teacher and the writer. The scores assigned the papers by the two readers were in rather close agreement. Thus in the final set, there was complete agreement in twenty-three out of thirty-three cases, one of the children of the supervised group having dropped out during the spring. In the remaining cases, the differences ranged from three to five points. For the purpose of computing the progress of children averages of the scores of the two readers were used only, and as the final scores, the average scores for the two final tests were used.

#### THE RESULTS OF THE EXPERIMENT

Do children profit from supervised study in English composition, when the teachers know what to do with children during the supervised study period in order to improve their methods of work? Table I furnishes an answer to this question. According to this table, the median gain for the supervised group is eight percent upon the initial ability as indicated by the scores from the preliminary tests, with a median deviation of 6.5. The median gain of the unsupervised group is three percent and the median deviation 6.62. This result is strikingly different from that obtained by Breed, who registers a loss for the supervised groups in English composition.

When we come to our second question, do children of superior ability profit less from supervised study or actually lose as a result of it, we find the answer in Table II.

TABLE I.—PERCENT GAIN OF EACH PUPIL OF THE SUPERVISED AND THE UNSUPERVISED GROUP FROM THE PRELIMINARY TESTS TO THE FINAL TESTS. SCORED BY THE THORNDIKE-HILLEGAS SCALE

SUPERVISED GROUP			UNSUPERVISED GROUP		
Number of Pupil	Coefficient of Brightness	Gain percent	Number of Pupil	Coefficient of Brightness	Gain percent
S17	122	21.8	16	99	19.4
S22	114	19.9	29	122	12.8
S-3	109	17.1	6	88	8.9
S-5	89	14.8	15	101	8.0
S19	104	10.9	25	98	7.8
S20	140	10.3	3	107	7.4
S 7	113	9.9	30	83	6.0
S26	98	9.1	4	97	3.2
S13	100	7.0	2	93	3.0
S28	98	6.2	12	103	2.1
S10	88	4.5	9	115	0.0
S31	92	2.6	32	110	0.0
S33	102	-3.0	34	113	-0.7
S14	97	-4.0	1	86	-6.8
S21	91	-6.2	18	99	-7.6
S 8	110	-8.5	11	83	-9.1
			24	118	-16.3
Median Gain.....	8.0		Median Gain.....	3.0	
Average Gain.....	7.0		Average Gain.....	2.6	
Median Deviation.....	6.5		Median Deviation.....	6.6	

In Table II the pupils ranking above and below the median in capacity as indicated by coefficient of brightness in each group are compared with reference to improvement made. Here we find that the bright members of the supervised group attained an improvement of 4.8 percent as compared with 1.66 percent for the corresponding numbers of the unsupervised group. The slower members of the supervised group achieved an improvement of 4.27 percent while the corresponding unsupervised group improved 2.72 percent.

If we take initial attainment as the basis of comparison, we find that the fifty percent of the supervised group making the best average scores in the tests improved 3.65 percent, while the corresponding fifty percent of the unsupervised group improved but .16 percent. The remaining half of the supervised group gained 10.37 percent, while the corresponding half of the unsupervised group gained 4.6 percent.

TABLE II.—SHOWING GAIN PERCENT OF UPPER AND LOWER 50 PERCENT BASED UPON COEFFICIENT OF BRIGHTNESS

SUPERVISED GROUP			UNSUPERVISED GROUP			
	Number of Pupil	Coefficient of Brightness		Number of Pupil	Coefficient of Brightness	
UPPER FIFTY PERCENT	S17	122	21.8	29	122	12.8
	S22	114	19.9	15	101	8.0
	S23	109	17.1	3	107	7.4
	S19	104	10.9	12	103	2.1
	S20	140	10.3	9	115	.0
	S 7	113	9.9	32	110	0
	S33	102	-3.0	34	113	-.7
	S 8	110	-8.5	24	118	-16.3
Average gain.....			4.8	Average gain.....		
LOWER FIFTY PERCENT	S 5	89	14.8	16	99	19.4
	S26	98	9.1	6	88	8.9
	S13	100	7.0	25	96	7.8
	S28	98	6.2	30	83	6.0
	S10	88	4.5	4	97	3.2
	S31	92	2.6	1	86	-6.8
	S14	97	-4.0	18	99	-7.6
	S21	91	-6.2	11	83	-9.1
Average gain.....			4.27	Average gain.....		

TABLE III.—COMPARING RATE OF PROGRESS OF CHILDREN ABOVE MEDIAN IN SCORES OF PRELIMINARY TESTS WITH THOSE BELOW MEDIAN

SUPERVISED GROUP				UNSUPERVISED GROUP				
	Number of Pupil	Aver-age Score	Coefficient of Brightness		Number of Pupil	Aver-age Score	Coefficient of Brightness	
UPPER FIFTY PERCENT	S31	68	92	2.6	24	72	118	-16.3
	S20	65	140	10.3	29	66	122	12.8
	S 8	65	110	-8.5	18	65	99	-7.6
	S13	61	100	7.0	4	63	97	3.2
	S28	61	98	6.2	34	62	113	-.7
	S14	61	97	-4.0	25	61	96	7.8
	S21	60	91	-6.2	12	61	103	2.1
	S17	59	122	21.8	9	60	115	0
Average Gain.....				3.65	Average Gain.....			0.16
LOWER FIFTY PERCENT	S33	58	102	-3.0	32	60	110	0
	S10	55	88	4.5	2	58	93	3
	S26	55	98	9.1	6	56	88	8.9
	S19	55	104	10.9	11	55	83	-9.1
	S22	54	114	19.9	15	53	101	8
	S23	51	109	17.1	16	51	99	19.4
	S 7	51	113	9.9	3	51	107	7.4
	S 5	49	89	14.8	1	51	86	-6.8
Average Gain.....				10.37	Average Gain.....			4.6

Table III comes nearest to supporting the inferences of previous investigators of this problem: i.e., children with high initial attainments under supervised study organization show but little improvement while those of low initial attainments show relatively high gains. But even these tables do not show actual losses for the supervised bright child and high gains for the unsupervised bright child. Is it possible that children in former investigations of the efficiency of supervised study were using a larger amount of time for their work than those of the supervised groups? Is it further possible that they received assistance in their homes which really made the work of the unsupervised groups supervised work? This experiment was controlled in order to prevent the assistance which children might receive in their homes and their use of more time for their tasks than the supervised group.

These tables also point out another possible difficulty with previous experiments. The gain or loss in these tables is based upon the score which children made in the preliminary tests, upon ability in the subject in which rate of progress was to be measured. Is it possible that the actual attainments in a given subject have been mistaken for capacity for achievement in that subject? By actual attainments, as indicated by the preliminary tests, seven out of sixteen children were misplaced, that is, they were classed with the pupils of low capacity when they should have been ranked with the superior. The pupils in question are Numbers 33, 19, 22, 23, 7, 15 and 3. It is of course possible that English composition is peculiar in this respect, that capacity correlates less closely with actual attainment than in other school subjects. Thus in the above group there were at least four boys who, while very capable in many lines, were not interested in writing compositions. It may also be objected that an intelligence test is not an absolutely sure indication of the intelligence of the pupils tested. This objection, however, would not hold in the present case, for in passing upon the validity of the division made there were available the results of other tests previously given and the teachers' estimates of the children's ability. The division into two groups,

therefore, was probably as accurately made as possible. It would seem, therefore, that this is a point which requires attention in future investigations involving the division of classes into groups of equal capacity.

#### SUMMARY

Our results seem to indicate that carefully directed study or work of children in writing compositions is decidedly valuable to children receiving such supervision.

The results of this investigation further indicate that under fairly skillful direction the brighter children of a supervised class not only make better progress than the brighter members of equal ability of the unsupervised group but that they also make better progress than the slower children of the supervised group.

The experiment seems to show that the methods used in the direction of the supervised group had sufficient merit to lead to decided improvement of the supervised over the unsupervised group and to indicate further that the brighter members of the group were helped at least as successfully as the slower members.

#### CONCLUSIONS

1. Supervised study in English composition is eminently worth while when teachers are able to direct children's efforts intelligently. For this purpose they must know the technique of learning in this branch and apply such knowledge to the varying needs of the individual members of the class.

2. While a knowledge of the various general factors of study is worth while, at least to the teacher, she must not stop there. Methods of work imply a large number of specific knowledges, habits, and attitudes which differ in the several fields of study and which must be acquired through successful completion of specific tasks in each field. The pupil can acquire effective methods of work only by working with purpose and intelligence under a teacher who knows intimately the most successful methods of procedure.

3. As in all teaching an intimate knowledge of children's interest and experiences as well as capacities is absolutely essential in directing their work.

4. In the present stage of progress in the teaching of English composition the writer believes that teachers of this subject would be greatly benefited if they had access to a case book describing how the needs of the various types of children can be best met.

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## SOME INDIVIDUAL DIFFICULTIES IN THE STUDY OF MUSIC

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One of the requirements of the Board of Education in California is that every teacher shall be able to teach the music of the grade to which she is assigned. She must, therefore, be able to sing the songs of the "Progressive Series," which is the prescribed textbook, and to read at sight readily enough to teach any other songs that may be needed. She must understand the technique of our music system, that is, the keys and their relationships and the staff notation.

In order to teach the staff, the keys, and the relationships of the syllables, the music department of the San Francisco State Normal School uses a series of bulletins which outline the minimum requirements. These are arranged in three units upon each one of which the student passes an examination. These units are as follows:

1. The student must be able to sing and write the scales of the tonic chord, in the keys of e-flat and f-major, getting the pitch from the pitch-pipe. These keys are used because they are within the staff and are pitched where the children sing.

2. The student must be able to sing at sight each measure of an exercise or song in 4-4, 3-4, or 6-8 time, with one sound to a beat, one sound to two beats, one sound to three beats, one sound to four beats, two equal sounds to one beat, and, in the case of 6-8 time, one sound to five or six beats using the keys and intervals studied in 1.

3. The student must be able to recognize and sing at sight skips of thirds, fourths, and fifths in the same two keys, and to apply them in the songs of Book 1, and also to pass a sight reading examination in an unknown song involving only these problems.

This is the outline of the course in music which must be mastered by any student before she is allowed to teach the simple primary songs.

In the fall of 1920 a survey of the students in the San Francisco State Normal School produced the fact that there were twenty-four who were conspicuously unsuccessful in their study of the music course after having carried it for three months. These students were not able to sing the songs alone either at sight when presented on the written page, or in true intonation. In order to determine whether or not the difficulty was one of inability to hear the tone differences which they could not produce, they were given the four sensory discrimination tests and the tonal memory test which have been recorded on the phonograph by Seashore.

The Seashore tests do not need a detailed description here. Suffice it to say that there is a test for pitch discrimination, one for intensity discrimination, one for the discrimination of duration of time intervals, one for the discrimination of the relative consonance of musical tones, and, finally, a test for immediate memory span for a series of nonsense musical tones.<sup>1</sup> These tests have been standardized and norms of percentile rank are published in the Manual.

To return to our students who are trying to learn to sing. The supervisor asks, "What is the cause of this inability to learn elementary music? Is it a general cause, or are there differences in their native capacity which make music so difficult for them to grasp; and how can I help each one most effectively?"

Before the tests were given, the twenty-four girls were sorted into three groups: (1) Six students of whom there was some hope that slowly and gradually they might come up to the required standard. These were called "hopeful." (2) Six students of whom the supervisor was in grave doubt, but of whom she still entertained a hope that by unusual diligence they might reach the standard. These were called "doubtful." (3) Twelve students who, the supervisor felt, gave unmistakable evidences of never being able to meet the required standard. These were called "hopeless." This ranking was done by the supervisor,

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<sup>1</sup> Seashore, *Psychology of Musical Talent*, Silver, Burdett & Co. See also *Manual of Instructions and Interpretations for Measures of Musical Talent*, Columbia Graphophone Co., New York.

entirely independent of the psychologist, and purely upon her observation of the actual achievement of the students, but in the light of her teaching experience.

Table I shows the percentile ranks of the twenty-four students according to the Seashore tests. In percentile ranking the highest possible mark is 100, the lowest is 1, and the median is 50. An average of percentile ranks does not have any particular significance, since the tests are of different values in diagnosis, but it is desirable to have some general designation of the individual record as a whole. For the purpose of grouping I have called the records which on the average fall between 1 and 15 in rank, very inferior; those from 16 to 30 inferior; those from 31 to 47 fair; and those above 48 good.<sup>2</sup>

TABLE I.—PERCENTILE RANKS ACCORDING TO THE  
SEASHORE TESTS

	STUDENT'S NUMBER	PITCH	INTENSITY	TIME	CONSONANCE	MEMORY
Hopeful	1	36	82	83	68	16
	2	87	74	32	6	60
	3	56	45	24	86	37
	4	87	22	54	46	30
	5	63	25	20	56	
	6	29	25	32	56	13
Doubtful	7	10	58	61	56	30
	8	87	14	20	18	41
	9	29	19	73	1	5
	10	3	51	24	18	2
	11	1	4	2	78	3
	12	26	25	3	3	..
Hopeless	13	1	66	78	56	2
	14	9	87	28	36	34
	15	29	58	37	18	23
	16	13	66	16	46	12
	17	5	51	24	26	11
	18	1	5	3	78	3
	19	26	4	24	3	..
	20	1	19	9	36	3
	21	4	22	32	1	5
	22	1	10	28	..	3
	23	1	19	13	..	1
	24	3	4	4	1	1

<sup>2</sup> *A Survey of Musical Talent in the Des Moines Public Schools, Child Welfare Research Station, Univ. of Iowa, 1920.*

When it is understood that the rating hopeful, doubtful, and hopeless was independent of the sensory tests, and when the rank of the students in each category is studied, a distinct correlation is immediately perceived. This is more fully brought out in Table II. In this table the divisions good, fair, inferior, and very inferior are based upon the general results of the five

TABLE II.—RELATION BETWEEN SUPERVISORS' JUDGMENTS AND RATINGS ACCORDING TO THE SEASHORE TESTS

SUPERVISOR'S CLASSIFICATION	CLASSIFICATION ACCORDING TO SEASHORE TESTS			
	Very Inferior	Inferior	Fair	Good
Hopeful.....	0	0	2	4
Doubtful.....	1	3	2	0
Hopeless.....	6	3	3	0

measurements of each individual. The divisions hopeful, doubtful, and hopeless are the empirical classifications of the supervisor. The figures in the spaces indicate the number of individuals under each of the double classifications. It is apparent that those who are hopeful are the highest in their sensory capacity, that those who are doubtful fall a little lower, and that those who are hopeless are undoubtedly the lowest in the sensory measurements.

I shall describe in detail a few of the cases. Each one is interesting and significant, but I shall limit my descriptions to a few of the more dramatic ones. I shall refer to them by the numbers used in Table I.

The supervisor's comment on No. 1 in September was that she had no experience and was very timid. It was this timidity that made me feel that the results of the first group tests were probably unreliable, and I tested her again with the results given in the table. Three months later the supervisor reported that while she was not especially strong in music and was very lacking in self-confidence, she was slowly learning the required songs and would be able to teach the simple songs at least. The student herself reports that when she learns the songs with the syllables she cannot then transfer the words to the melody and, therefore, is very slow in learning the material. The process demanded

by the teachers (that of first learning the syllables) which is a help to many, is a hindrance to her. Her motor coordinations are persistently inflexible with this resultant difficulty. She also has a distinct sensory inferiority, since she does not remember tones, as such, as well as the majority of normal people do. These two weaknesses, in connection with a lack of self-confidence, will make her slow, but there is no reason why she cannot ultimately learn the music required.

No. 2 is a case of another timid soul who does not show her true capacity at first. In September the supervisor reported that she could not sing a melody alone. Three months later she reported that she was singing with great timidity and getting her work very slowly, but that she was able to sing the simple primary songs with an accurate voice of pleasing quality. It is not a sensory difficulty, then, as the tests show, nor a motor difficulty, as the accuracy of her singing shows, but a temperamental difficulty; and she is, therefore, properly classified as "hopeful."

No. 8 was found to be fair in her sensory capacity. The supervisor said: "Her voice flats; she cannot remain true." Three months later, although the student had been working faithfully at her music, the same report was made. In the supervisor's words: "Her voice flats very markedly; she goes quite off and it is a surprise to her that she isn't doing it correctly. She only approximates a tune. She can read and is trying hard to finish her music. If she could retain the pitch, she would be all right." No. 8 is one in whom the sensory capacity is not the important weakness; her difficulty is in motor capacity. There are people who can see a ball and who can hold a tennis racquet, but who have great difficulty in learning to hit the one with the other. In the same way there are those who hear the pitch of tones and who can use their voices for ordinary purposes, but who cannot hit the pitch of the tones accurately with their voices. No. 8 is an illustration of this kind of motor difficulty. She will have to take very intensive practice in gauging the pitch distances which her voice must control; and by such drill alone will she be able to improve the accuracy of her singing.

No. 10 was reported in September as having no musical experience. Three months later the supervisor said of her, "She appears to have no conception of what reading means. She doesn't look at the right place in the book. She can imitate tones but seems to have no power to concentrate on the problem of reading." With her inferior rank in the sensory tests she probably cannot remember the tones for any length of time. She may have no particular weakness in motor capacity, but if, in addition to her inability to learn to read the notes, she is further handicapped by inferiority in intelligence, she will probably never be able to do even the minimum in music.

No. 15 was reported as being weak in music, but the supervisor was not sure whether this was due to lack of previous experience or to natural incapacity. Three months later the supervisor had found that No. 15 could not yet sing a melody and had very little conception as to whether or not she was singing correctly. She displays fair sensory capacity but is probably lacking in motor control and coordination. She is very intelligent and could undoubtedly improve her motor attack to some extent.

No. 17 was simply reported as being weak in music. Later the supervisor noted that if she worked on a tune long enough, she got it but not with perfect accuracy. Another supervisor asked her in my presence to sing a tiny melody of four tones not more than a step apart. She made three attempts but went in the wrong direction on each trial. The tests show that she is distinctly inferior in her sensory capacity, and she is also evidently inferior in her motor capacity. Whatever she learns to sing will be acquired slowly and with great difficulty and will never be accurately retained. She loves, however, to listen to music and works diligently at it, although she knows that she is accomplishing very little.

No. 22 was reported as having no previous knowledge of music. Three months later the supervisor's report says, "She sings down when the notes go up, and vice versa. Time values she also cannot comprehend, although she has had special training in a small class. A song that she once learns, largely by

hearing it, she can sing." Here is a case of very inferior sensory capacity linked with inferior intelligence which means that she will learn even the minimum amount of music only by the greatest expenditure of effort on her part and specially adapted training on the part of her teachers.

From these briefly described cases some general observations may be made. Difficulties in learning music are of at least two distinct kinds; there are sensory weaknesses and there are motor weaknesses. Each may exist in an individual by itself or in connection with the other. Either one alone puts the possessor into the class of those who learn music slowly, painstakingly, and—often in the end after much effort—ineffectively. If to these weaknesses is added slowness in general intelligence the situation becomes even more difficult. Those who are found to be of either or all of these three classes must be trained individually by methods specially adapted to the particular case.

At the San Francisco State Normal School an effort is being made to give special training to these students. The work is yet in the experimental stage, so that I cannot describe any final results. The students who were graded as hopeless have been grouped together into a special class, where they are taught to sing some simple primary songs together by note. These they sing with haziness of intonation but with a rather surprising approximation to the pitch. When each student sings alone, she is not at all sure of herself. The quality or timbre of their singing is very bad, and apparently they are very vague in a conscious conception of what they are doing. By this I mean that they are not accurate in the beginning and ending of phrases or in the actual relationship of pitches. They rely upon their teacher and upon one another. I felt when I heard them sing in a group and individually as I do about a little child who is learning to walk. I admire his tottering efforts when I consider that he is a little child. But if I consider his achievement as walking I must admit that it is not a very successful performance. So I feel about these students who are deficient on the sensory or motor sides of their inborn equipment for music; it is surprising

that they can sing at all, propping themselves up on each other and leaning on their teacher, but as real singers they are very bad.

The results of this study, reinforced by previous observations of similar cases, lead me to the belief that those who are weak or inferior in hearing the characteristics of musical tones will be weak and slow in reproducing them. It would undoubtedly be more economical of effort, both on the part of the student and of the teacher, if they could be released from the drudgery of trying to learn something which is so difficult, and could turn their energy and talents to a field where achievement would be more notable. But, since under the present circumstances we must train them as well as we can, we must reinforce their auditory-motor weaknesses by artificial associations. For instance, the tonoscope may be used to give a visual correction of faulty intonation, or an artificial association of tones with colors may be deliberately used to improve tonal memory. Various synesthesia, according to the needs and capacities of each individual, may be worked out as crutches for the lame ducks in music. This immediate problem of forming artificial associations is a very interesting one on which I hope to be able to report later.

## INTELLIGENCE TESTS AND THE CLASSROOM TEACHER

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Tests, either intelligence or achievement, may be given for three reasons: (1) for the purpose of collecting data; (2) for the purpose of satisfying the curiosity of the teacher; (3) for the purpose of bringing a definite constructive help to the teacher in guiding and aiding her in dealing with some of the problems with which she is confronted.

Up to the present, much of the work of educational measurement has been concerned with the first step. This is important. It has made it possible to establish standards, it has confirmed the theories that the educational product is variable and not constant, it has emphasized and placed on a more or less scientific basis, perhaps, the greatest educational fact of the past generation, namely, individual difference. There is still need for a great deal of work to be done along this line. This research work is the work of universities, foundations, and similar bodies and not the work of city departments, which are supported by public money. Their research work, *per se*, is a by-product.

It is a good sign to see the teacher's curiosity aroused to know what her class will do with certain tests. Perhaps she has a suspicion that *her* class will not show marked signs of individuality because *her* class was a selected group and because children of about the same grade of ability were put together in her room. Therefore she is curious to see if some of the theories of the savants can not be exploded and is much surprised to find that there is, perhaps, as great variation in her room as in another room not so carefully selected.

The teacher who is curious to know what will happen when a test is given should be greatly encouraged, because out of the "knowing" is going to come "doing." Out of the knowledge of where each pupil stands is going to come a better directed effort

to help those who need help, to drill those who need drilling, and to guide those who need guiding. The efficient teacher is the one who is accepting all the help which tests can give in promoting, drilling, and guiding. Such a teacher makes it justifiable for a city school system to expend public money for a department of research. Directly or indirectly such a department makes it possible for the taxpayer's son and daughter to be better and more efficiently taught than before; better taught because both teacher and pupil have a definite aim toward which to press, and more efficiently taught because the teacher with a more direct knowledge of what the child is able to do can save valuable time.

#### INTELLIGENCE TESTS

During the past few years intelligence tests have held a prominent place in the testing program of departments of research and of all up-to-date superintendents. Such tests are fraught with a good deal of difficulty unless one is careful how the results are used and unless the one in charge realizes the limitations of such a test. Two cases will illustrate what I mean.

In a certain city one of the well-known group intelligence tests was used and a certain pupil scored low. The score was so low that the pupil was judged feeble-minded by the principal, and the parents were asked to withdraw the pupil from the school. The parents objected, and when he was tested by a competent person, using the Binet-Simon scale, the boy showed an intelligence quotient of 123.

The second case was a girl in one of our Boston schools who tested low with the National Intelligence Test but who was judged one of the brightest children in the school by the teachers. The possibility of such a condition was admitted, but an individual test was given. The girl showed an I. Q. of 115. It was found upon investigation that, on the morning the group tests were given the girl had come from home after witnessing a brawl between her father and mother in which she was obliged to take some part. She had had no breakfast and had taken the test within half an hour after arriving at school.

The giving of a group intelligence test in a public school system by the superintendent or director of research, may have one or more of a number of possible objects in view. In Boston there have been four main reasons for giving such tests: (1) to guide teachers in making promotions; (2) to guide pupils in their choice of courses; (3) to advance demoted pupils; and (4) to guide teachers in dealing with individuals who are failing in their work.

#### USE OF INTELLIGENCE TESTS IN MAKING PROMOTIONS

In March, 1921, 45 districts were tested with the National Group Intelligence Tests. In spite of the request of most of the principals that all grades should be included, only Grades VI, VII, and VIII were tested, owing to the expense and inability to handle results.

Grade VI was tested in order that the results might be used in the promotion of children to intermediate or junior high schools. Grade VII was tested with the expectation that the eighth grade would be better organized for promotion to high school the succeeding year. Grade VIII was tested that teachers might have the data to guide them in promoting to high school. The succeeding fall the data collected from Grade VIII were also used by the high-school principals and teachers.

In promoting a pupil, two factors were taken into consideration—his test score, and his teacher's mark. If the two agreed, there was no particular difficulty in settling the question of promotion. If the individual's test score was high and the teacher's mark low, he was promoted on the basis of his test score. If the teacher's mark was high and the test score low, he was promoted on the basis of the teacher's mark. In either case, it will be noted, the pupil was given the benefit of the doubt. These pupils, therefore, became marked pupils and have been problems for study during the year. How far children who were promoted on teachers' marks have succeeded will not be known until the end of the year.

### INTELLIGENCE TESTS AID IN GUIDING PUPILS TO CHOICE OF COURSES

Children entering the seventh grade in any Boston intermediate school, may choose to take a modern foreign language, either French, Spanish, Italian, or German. Each school may have only one foreign language, however. Because this modern foreign language is an extra subject, only those children are allowed to take it, whose marks are equivalent to an average of *B*.

Of 51 children in one school who were tested in the sixth grade and placed in French classes, 25 percent had a score of less than 109, the median of the sixth grade. Of this 25 percent, 39 percent made good, but in every instance effort and conduct were excellent. Of the 75 percent who were above the median, only 2 persons or 4 percent failed. One of these had an effort of *E* and a conduct of *D*. This school is typical of all intermediate schools.

Therefore, for a pupil who scores below the median the chances of success with a program which requires an extra amount of work are about two chances out of five, and then only because effort and conduct are excellent. When the pupil's score reaches 120, the chances of success amount almost to certainty.

When children enter high school they are required to select a definite course which may lead to a college, technical school, normal school, or business. In many cases children desire to take a college course, who are totally unfitted either to profit by such a course or to handle the necessary preparatory work. Such children are not warranted in spending their time either in high school preparing for college, or in college, providing they barely reach the minimum requirements for entrance.

Making a careful study of the relation between the score of an intelligence test and the marks obtained by an individual in his high-school work, will enable us to prophesy the chances which the individual may have to complete his high-school work successfully.

Table I shows that Pupil No. 1 is 14 years 8 months old. In the Binet-Simon Test he showed an intelligence quotient of 99.

In the Terman Group Test he received a score of 104; and in the Army Alpha Test a score of 107. The marks in his elementary and high-school subjects are in his major subjects.

Number 11 in Table I is a boy who came to one of our high schools at the age of 15. He entered from the Lyman School, which takes incorrigible cases sent by the courts. He has a bad temper and does not get along with other boys. He gave acceptable definitions for 45 words in the first column of the vocabulary used in the Stanford Revision of the Binet-Simon Test. He answered all but one question used in the Superior Adult test

TABLE I.—COMPARISON OF INTELLIGENCE SCORES AND TEACHERS' MARKS

PUPIL	AGE SEPT. 1	I. Q.	NAT. INTEL. TEST	TERMAN TEST	ARMY ALPHA	GRAMMAR SCHOOL MARKS	HIGH- SCHOOL MARKS
1	14-8	99	...	104	107	B A B	C D C E
2	15-6	82	...	76	85	C C D	C D C E
3	13-1	107	141	68	95	C C C	C C C D
4	15-4	87	...	59	65	B B B	D C D C
5	13-10	87	117	93	95	C C B	B D D B
6	14-6	81	100	79	91	D C D	C D C E
7	14-7	88	...	38	62	C C E	E E D D
8	15-10	88	...	91	91	...	D C D C
9	14-2	100	118	100	92	C C C	B B B B
10	13-1	97	...	59	...	C C D	D D C C
11	15-5	118	...	165	136	...	B B A B
12	16-6	61	...	31	...	C C D	E E E E
13	14-7	81	110	69	59	C C D	C D D C
14	14-11	93	...	60	82	E E D	D C C D

satisfactorily. He is now taking two subjects in addition to his regular work and is planning to take trigonometry at an evening school. After an hour's talk (and he talked very freely), it is evident that the only trouble with the boy is the fact that he never had enough to do in school. He was a boy who could have done considerably more than was required but his spare time was used in getting into trouble.

A certain boy, A. B., in one of the high schools had been taking an industrial course for three years. His work was eminently satisfactory. An older brother, however, had graduated and entered technical school. This had created a desire in A. B.

to attend technical school also. He had previously tried the technical course and failed. The mother requested that the boy be tested to find out whether he was capable of doing the work of a technical school. The boy tested slightly above normal. After a long talk in which the boy agreed that he would rather be a good mechanic than a poor or fair civil engineer, it was decided that he should re-enter the mechanical course. At the last report the boy is happy and contented, doing a thing which he can do well.

A second case in the same school, a boy who remained there because his father so insisted, had an I. Q. of 79. He had failed in freshman classes for two years and was failing the first year in the sophomore class. Since giving the first test the boy has been withdrawn. The practice, however, of withdrawing a boy who is not keeping up, even though he may not be able to do so, is not a solution of the matter. The boy has a right to as much of an education as can be given. The state is insisting on more and more.

Determining mental ability for purposes of differentiating between those fitted to do the work now required at any stage of the educational program, and those unfitted to do the work, means the organizing of a suitable program for those who find the present curriculum ill-adapted to their particular needs. In determining this mental ability, an important question arises regarding the extent to which it is wise to go in our differentiation.

#### INTELLIGENCE TESTS AID IN ADVANCING DEMOTED PUPILS

Many children are obliged to repeat a year on the basis of teachers' marks. It is known that teachers' marks are to a large extent unreliable. This results sometimes, in requiring children to repeat a year's work, who are mentally capable of doing the work of the next grade.

In testing certain classes early in September, 1920, the poorest class in a certain building was easily identified, and it was interesting to find that this poorest class was composed of seventh-grade pupils who had not been promoted. Of the 33 children

in this class, however, seven were found to be mentally superior. On the basis of the intelligence test, these seven children were granted permission to go into the eighth grade on trial, providing they showed good effort and good conduct. Four out of the seven made good.

#### INTELLIGENCE TESTS GUIDE TEACHERS IN DEALING WITH INDIVIDUALS

Children are constantly failing in their school work, and many times the teacher is unable to tell, either certainly or quickly, the real cause of their failure. Even though the intelligence test has not yet become a perfect instrument, it does give an indication of what ought to be expected of a given individual. In many cases the pupil is recognized as a good pupil, but is not giving the kind of work of which he is capable.

C. D. was a boy, who had been judged by teachers to be of good material, but lazy. Teachers had always said, "*I think* he has good ability." The father said, "*I believe* he has good ability." The boy insisted he was doing all he could. His score in the intelligence test was the highest in the district. The statement of teachers and the father now changed from "*I think*" and "*I believe*" to "*I know*." The boy recognized that he was caught and changed from a fair scholar to a superior one.

E. F. was a girl who gave a great deal of trouble. Her father was a constant visitor to the school. He insisted she was a bright girl. The teachers constantly insisted that she had never shown any signs of a high degree of intelligence. The test showed her among the best. The problem now is, "How can the teachers get from this pupil the work she is capable of giving?"

#### INTELLIGENCE TEST IN AN ACTUAL SCHOOLROOM

Figure 1 shows the seating plan of an actual sixth-grade room. The school is situated in a Jewish quarter, and all but two or three children in the room are of Jewish origin. Most of them were born in the United States, and have had the advantages of the city schools up to the sixth grade. In most

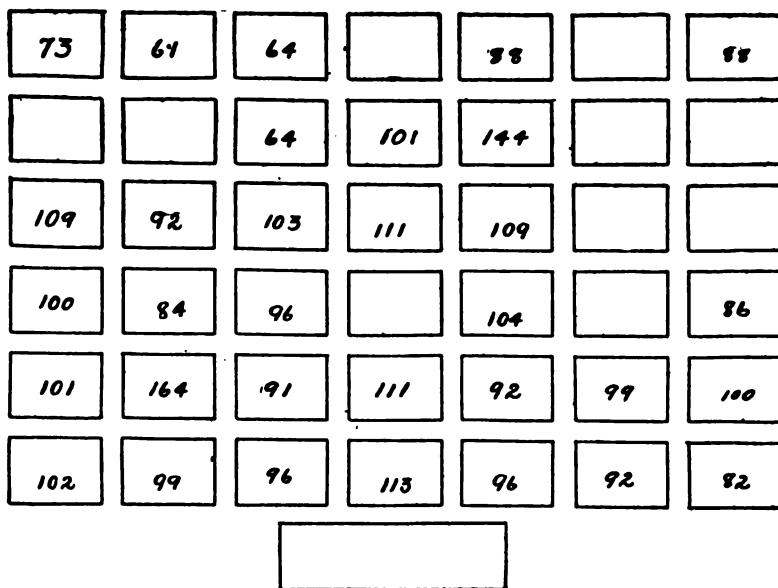


FIGURE 1.—SIXTH GRADE SEATING PLAN SHOWING PUPILS' INTELLIGENCE QUOTIENTS

cases, however, the language of the home is Yiddish, because the mother rarely speaks English. The numbers placed in the small rectangles represent intelligence quotients based on the Stanford Revision, all children having been tested either by the author or under his direction. It will be noted that the intelligence quotients range from 61 to 164.

The teacher of this room is, therefore, obliged to face each day children ranging all the way from superior mentality to a mental condition which borders on, if it is not actually equal to, that of a high-grade moron. She is expected by principals and other supervisory officers to prepare these individuals for promotion to Grade VII, with the expectation that after they have been promoted to Grade VII they will be able to do the work of that grade. The intelligence test often shows the utter impossibility of any teacher's doing the work that is expected of her.

Figure 2 shows the same schoolroom tested with the Thorndike-McCall Reading Test. The numbers in the small rectangles

indicate the reading quotients of these same individuals. Owing to absences there are one or two discrepancies between the individuals of Figure 1 and Figure 2.

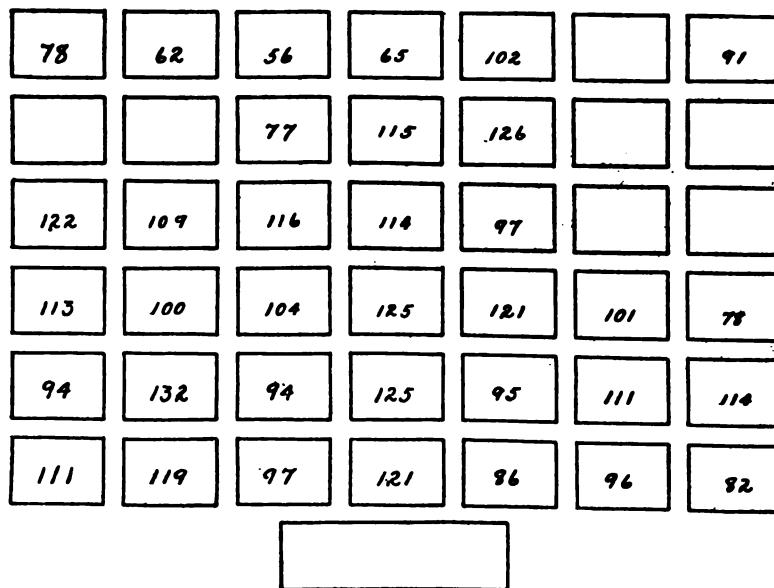


FIGURE 2.—THE SAME SEATING PLAN, SHOWING READING QUOTIENTS

These reading quotients indicate the same variation between the pupils as was shown by the intelligence quotients in Figure 1. A close study of the two quotients will show also a fairly close correlation between them.

#### INTELLIGENCE TESTS AN AID IN ORGANIZING CLASSES ON A BASIS OF MENTAL ABILITY

It seems to the writer an open question how far the intelligence quotient can be determined from the results of the group test. The factors determining the results in the intelligence test are so variable, that it does not seem possible to make them constant enough at the present time to determine a reliable intelli-

## SCALES FOR MEASURING RESULTS OF PHYSICS TEACHING

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Those who are familiar with the teaching of high-school physics realize the need of scientific investigation to aid in solving a number of vital questions. The following are some of the most significant of these. To get the results sought, how much time should be spent in performing laboratory experiments? Do the results of laboratory work justify the expense involved in furnishing several sets of equipment? How should the time for the study of high-school physics be distributed as to: work in the laboratory, learning the fundamental principles, solving problems, recitations, and observation of class-room demonstrations? How may the course of study be revised to meet more fully the needs of the majority?

In attempting to solve some of these problems one is confronted with the need of suitable tests or scales with which to measure physics ability or achievement. If we have such measuring instruments we may by varying the time devoted to laboratory experiments ascertain the resulting degrees of progress. Similarly, the relative advantages of single and duplicate sets of apparatus, of different combinations of laboratory work, observation, problem solving, etc., and of various other devices and procedures may be determined through the achievement of the pupils.

Few outstanding contributions have been made to the field of high-school physics testing. Starch<sup>1</sup> arranged 75 mutilated sentences involving 102 fundamental principles treated by five most commonly used textbooks; but he did not give the relative difficulties of these 75 test exercises. Chapman<sup>2</sup> reported the per-

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<sup>1</sup> Starch, Daniel, *Educational Measurements*. New York: The Macmillan Company, 1916. pp. 188ff.

<sup>2</sup> Chapman, J. C. "The Measurement of Physics Information," *School Review*, 27: 748-56, December, 1919.

cent of pupils in Cleveland high schools who correctly solved each of 30 or more exercises devised and selected by a group of physics supervisors and teachers. E. L. Thorndike has devised several physics tests for college students but none for high-school students.

Because of the need for additional material to be used in testing high-school physics achievement, the writer has derived "Scales for Measuring Results of Physics Teaching" which have been published by the State University of Iowa in its *Studies in Education*, volume II, number 2.

On the basis of the aims of science teaching in the high schools of the North Central Association as reported by H. A. Greene,<sup>3</sup> the primary objects of physics teaching were taken to be: (1) to give knowledge of natural phenomena, (2) to serve as a guide for daily life, (3) to impart a scientific attitude, and (4) to prepare for college entrance. In formulating and selecting test exercises for the physics scales, the writer has assumed that the two most important aims are: (a) knowledge of the fundamental principles, and (b) ability to put such knowledge to use in solving the problems one meets in ordinary life.

The task was, then, to formulate, select, and evaluate exercises, the correct answering of which would involve one or both of these types of physics ability. It was also necessary to have exercises whose difficulties varied by easy stages from rather easy to extremely difficult. The test exercises finally selected are of two general types, factual and problematic; and they are designed to measure ability in (1) mechanics, (2) heat, (3) electricity and magnetism. The following exercises are typical:

"What is the common name of the instrument used to measure the pressure of the atmosphere?"

"What is the common name of the time-rate of change of velocity?"

"In the ordinary electric light bulb there is little or no air. When a bulb is broken will the glass start moving toward the center or away from the center of the bulb?"

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<sup>3</sup> Greene, H. A., *Status of the Sciences in North Central High Schools*, State University of Iowa, Thesis, (1917).

"What is the density of a block of wood that floats  $\frac{3}{4}$  under water?"

"What is the possible buoyant force of 78 pounds of cork whose density is 15.6 when water weighs 62.4 pounds per cubic foot?"

In selecting the exercises the following requirements were used as a guide: (1) The test exercise must apply specifically to the field of knowledge to which the test is related. (2) It must be taken from an essential part of the subject, a part which is contributory to understanding or summarizing a general theory or principle; in other words, it should be such that a correct answer would indicate that a distinct meaning had been grasped. (3) It must be so worded as not to be ambiguous. (4) It must be so framed that it can be answered very concisely, usually by a single word, or at most by a short phrase. (5) It must be such that the short answer given in the test includes all possible correct answers.

The exercises were arranged in 47 different preliminary tests of nine or ten exercises each. The correct solutions of these exercises were attempted by approximately 3500 boys and girls in 129 of the best high schools in Iowa. Each test was distributed over the state so that the pupil-reactions on the exercises included in it would be representative of the state as a whole. On the average each exercise was attempted by 99 different pupils (minimum 60); and each test was given from eight to ten weeks after the work in the field to which it applied had been finished.

The Probable Error method was used in evaluating the exercises. The results, shown by a statistical treatment of the data gathered, justify the fundamental assumption of this method, namely that the distribution of physics abilities conforms approximately to the Normal Probability Curve of Distribution. An exercise so easy that only 1 in 10,000 would fail to solve it correctly was assumed as an exercise of zero-difficulty. Its position on a linear scale of difficulty is at —6 P. E. or about (—4 sigma); and all the test exercises finally used in the scales were assigned

values with reference to this location as a point of departure, or zero point.

As a result of this investigation, three scales have been developed including 289 exercises in all. These scales are distinctly separate. As has been stated, they include exercises to measure ability in the three fields of Mechanics, Heat, and Electricity and Magnetism. In each case about half of the exercises are designed to measure "knowledge of fundamental principles" and half to measure "ability to make useful application of such knowledge."

For each exercise the average amount of time used by those who correctly solved it has been determined so that from the scales we may select exercises to form both rate tests and power tests for any one or more of the three phases of physics. If desirable, one can form a test from either type or from both types of tests exercises, i.e., factual or problematic. The author has formed ten tests, (including both types of exercises), four forms for mechanics, three for heat, and three for Electricity and Magnetism,—which will be available soon from the Extension Division of the State University of Iowa. The general character of the tests may be inferred from the following exercises which are in each case the first or easiest five of Form I in Mechanics, in Heat, and in Electricity and Magnetism.

#### MECHANICS

1. What is the common name of the instrument used to measure the pressure of the atmosphere? (value 4.3)
2. If a 50 pound ball falls 100 feet and all its energy is transformed into work, how much work will be done? (value 5.3)
3. In the ordinary electric light bulb there is little or no air. When a bulb is broken will the glass start moving toward the center or away from the center of the bulb? (value 6.0)
4. What is the density of ice when 100 cubic centimeters weigh 92 grams? (value 6.8)
5. What is the efficiency of a machine when a force of 50 pounds acting through a distance of 30 feet lifts 200 pounds 6 feet? (value 7.3)

#### HEAT

1. What is the common name of the process by which the sun transmits heat to the earth? (value 4.8)

2. From the following select a good conductor of heat: wood, stone, air, copper, water, vacuum, iron. (value 6.3)
- ✓3. What is the common name for the action which takes place when an iron ball is warmed from 10 degrees C. to 20 degrees C.? (value 6.9)
4. At ordinary atmospheric pressure ice melts at 0 degrees C.; to make ice melt at -2 degrees C. would we increase or decrease the pressure? (value 7.8)
5. What is the common name of the process by which heat is carried from one place to another by a moving fluid? (value 8.5)

#### ELECTRICITY AND MAGNETISM

1. From the following select one which is a poor conductor of electricity: graphite, glass, hard rubber, pure water, paper. (value 3.6)
- ✓2. What is the common name of the electro-motive force needed to drive a current of one ampere through a resistance of one ohm? (value 5.7)
3. Will positive electrification attract negative electrification? (value 6.3)
- ✓4. With what kind of a cell should the circuit be kept open when not in use? (value 7.8)
- ✓5. What kind of positive and negative static electricity is formed on a conductor in the neighborhood of a charge? (value 8.7)

Table I shows the tentative norms on Form I of each test for boys and girls in Iowa high schools.

TABLE I.—TENTATIVE NORMS (FORM I)

	MEDIAN SCORE			INTER-QUARTILE RANGE		
	Boys	Girls	Total	Boys	Girls	Total*
MECHANICS...	39.5	30.6	33.5	24.6—53.3	18.4—44.3	21.0—49.0
HEAT.....	44.4	40.1	41.9	29.9—58.1	25.8—53.1	27.4—55.1
ELECTRICITY AND MAGNETISM...	46.3	36.5	39.9	33.2—61.8	25.5—49.3	28.0—54.6

\* Total refers to both boys and girls.

The three scales and the tests available therefrom, when properly selected, administered, and scored, should prove to be of considerable value: (1) to the experimenter, as a means of comparing the results of two or more methods of teaching the same subject matter; (2) to the college or university, as a part of

entrance examinations; (3) to those who make school surveys; (4) to supervisors, in comparing the progress and attainment of different classes or schools and the results of different methods of teaching or of different classifications of pupils, in determining the amount of time to devote to different phases of the subject, and in determining what the course of study shall include; (5) to teachers in checking the results of teaching, as a guide in making the instruction more practical and valuable for all in a given group, and in determining the specific needs of individuals.

## CONVENIENCE AND UNIFORMITY IN REPORTING NORMS FOR SCHOOL TESTS

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The desirability of securing some uniform procedure for scaling the achievements of pupils in school tests is evidenced by the recent attempts and suggestions which have been made by several authors. Reference may be made to the work of McCall,<sup>1</sup> Pintner,<sup>2</sup> Buckingham,<sup>3</sup> and Buckingham and Monroe.<sup>4</sup> These very recent papers indicate the extent to which trained workers in this field realize the necessity for some definite conventions. For the larger number of individuals without much training, who are using these tests in practical work, there is even more necessity for definite agreement. An association such as this journal represents could hardly fulfil its function better than in furthering this attempt to secure uniformity and order, in a situation which as it now exists is chaotic.

At present a score of twelve in one test means the same level of achievement as fifteen, thirty-five, or seventy-one in another test. Even after we have transmuted from the crude scores to equivalent scores, there is again no uniformity. A score of fifty may mean the median achievement of unselected twelve-year-olds, as in McCall's plan, or the median achievement of an unselected group of any age as in Pintner's procedure, or the achievement of a particular mental age as in the method of Monroe and Buckingham.

We must work for an agreement whereby after the transition has been made from the crude score to the equivalent score, the latter will have an obvious meaning. This meaning must be

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<sup>1</sup> McCall, William A. "A uniform method of scale construction," *Teachers College Record*, 22: 31-51, January, 1921.

<sup>2</sup> Pintner, Rudolf and Marshall, Helen. "A combined mental-educational survey," *Journal of Educational Psychology*, 12: 32-43, January, 1921.

<sup>3</sup> Buckingham, B. R. "Suggestions for procedure following a testing program," *Journal of Educational Research*, 2: 787-801, December, 1920.

<sup>4</sup> Buckingham, B. R. and Monroe, Walter S. *Illinois Examination, Teachers Handbook*, 1920.

simple, and above all it must be expressed in terms immediately applicable to the practical uses to which tests are put by schoolmen. The present almost complete lack of uniformity in reporting standards is unquestionably complicating and in many cases preventing the use of educational scales in the schools.

Binet and Terman have fulfilled the above requirements in the field of mental measurement. Perhaps, as is indicated later, their method of reporting mental ages has sacrificed too much to the desire to be readily interpretable by the layman, but they have at least used a very simple unit of measurement. Possibly the wide use of intelligence scales is partly explained by the obvious interpretation of their results.<sup>5</sup> It is certainly not too much to ask, that in the near future a somewhat similar uniform procedure may be adopted in the field of educational measurements.

McCall makes the plea that all tests be standardized and the equivalent scores be expressed in terms of an adapted sigma distribution of unselected twelve-year-olds. Involving as it does a continuous scale; many advantages are at once derived from such a procedure; these are well summarized in his article. In discussing some of the weaknesses of his proposal, these merits must not be overlooked. The following disadvantages must, however, be given careful consideration. Some of them, in the opinion of the writer, are sufficient to prevent his procedure from being adopted in school practice.

(1) It is impossible to scale even the moderately low performances of the lower grades, and the high performances of the upper grades. This is because the data for twelve-year-old pupils become so extremely attenuated or non-existent as to make any scale score unreliable, or impossible to determine.

(2) McCall's basic assumption is very much open to dispute. This is that however irregular a distribution of the twelve-year-old population may be, the distribution of all the other age populations is exactly, or within reasonable limits, the same. While

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<sup>5</sup> At least it appears obvious on the surface; this obviousness disappears on closer analysis.

such an assumption may well be true for tests which are very carefully constructed, and for tests which measure some skill such as reading ability by material which is easy for the lowest age population considered, it is more than doubtful whether the assumption holds for tests which are less carefully assembled, and for tests which measure informational material rather than some basic skill of steady growth.

(3) There will be a natural tendency on the part of the casual user of tests so standardized to assume, for a particular group, other than twelve-year-olds, that forty on the scale for one test is really the equivalent for that group of forty on the scale for any other test. Great practical advantages would be derived from any scheme so constructed that, for any particular group considered, a score of forty would mean the same level, with respect to that group, in any test, just as in McCall's scale a score of fifty or any other score means the same, for the twelve-year-old population, in every test. Owing, however, to the differences in overlapping of any two groups in different tests a score of forty on his scale in one test would be attained by  $x$  percent of a particular population, other than twelve-year-old, while the same score in another test would be attained by a quite different percent. Thus while a scale score of  $t$  units means the same, irrespective of the test, for twelve-year-olds, it would not have the same meaning for any other population.

(4) There seems something incongruous in standardizing tests, covering material taught in Grade VIII or VII, on a population of which a considerable portion has not been subject to instruction. This point will be returned to later.

(5) There is the less academic but more practical question as to whether the school people who give the tests are not more interested in thinking in terms of grades, that is in placing a child in a particular group, than in discerning his position on a scale calibrated with an unselected group of twelve-year-old pupils. Usually the question is one of promotion, or transfer to some other group. Where the thinking is done in terms of grades there is a great advantage in having the median and other per-

formances of each grade in some constant term. While unquestionably as far as grade seven is concerned the median performance on the McCall scale will be approximately fifty, for all the other grades, the standards and achievements of the various levels will have to be expressed in units which will be by no means self-evident. Thus a score of thirty when made by a fifth-grade child will not carry its meaning on its face; it will only, after reference to further tables, tell us how he stands in his own grade.

For purposes of standardizing new tests, there are great advantages in McCall's method, but for convenience of use in the schools, it would seem that a method centering around grades has very distinct advantages. Of course McCall's scale could again be turned into levels of achievement at the various grades. For the schoolman, however, this is a gratuitous intermediate process.

Pintner has employed almost the same method as McCall, but instead of using a single age group, he uses all the unselected age and grade groups. He also is guilty of pressing his data beyond the point at which reliability can be obtained.

Furthermore, while the small word "unselected" can easily be inserted as a requirement in the standardization process, an unselected age group is irksome to secure, whereas an unselected grade is usually to hand waiting to be tested. While unquestionably the age group is slightly more stable and more constant than the grade group, it may still be more practically advantageous for McCall to use an unselected mid-year grade group such as Grade VII than an age group. The burden of proof rests upon those who advocate the use of unselected twelve-year-olds that this gives any added advantage commensurate with the administrative difficulty of securing such a group.

For we cannot too often warn ourselves not to go to too much trouble to standardize. We are always standardizing our test by a criterion which we trust is changing. In other words, we design our tests as part of a larger movement which it is hoped will change the conditions themselves by which we standardize. It is

as though in a cold country where there are no thermometric standards we should attempt with elaborate minuteness to standardize the points on our scale by taking at a particular period of time the average temperatures of a large number of dwellings, simultaneously starting a movement, with the help of the scale thus standardized, to raise the average temperature of the houses. The more effective the movement and the more our scale hastened the change, the more impossible it would be to maintain anything more than a rough standard of temperature. To select our houses too carefully or to spend much time in calibrating our instrument by such a criterion would obviously be absurd. Now this is the exact state of affairs with certain of the scales. Thorndike and McCall recommend their reading scales as devices for improving the objective product; yet it is by this product, a changing factor, that they propose to standardize the scale. For rough estimates no doubt this procedure is justifiable, but it shows how easily too much time may be spent in elaborate standardization. All this is pertinent to the question as to whether an age group which is difficult to procure, furnishes a sufficient amount of increased stability to justify its use.

There is of course no need, when considering the relative merits of age groups and grade groups, to decide exclusively in the favor of one or the other. Both are essential. This paper makes the plea that, all things considered, the grade group is not only more convenient but also more significant in school practice and school thinking. Age groups will, however, have to be used for many purposes and, suggestions are later made for a uniform scheme of presenting results for such groups, similar to that suggested for grade groups. For example, in the matter of intelligence we have every right to think in age groups. Probably the best procedure is to place a child in each age group, and make no attempt to refer him to groups that have had more or less years of environmental experience. Any such comparison is perilous at best. This point is taken up at fuller length in an experimental study on "A Further Criterion for the Selection of Mental Test Elements."<sup>6</sup>

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<sup>6</sup> An article to appear in the *Journal of Educational Psychology*, May, 1922.

It is quite apparent that if the passage is to be made from crude scores to achievement quotients, based on mental age, one must work with age groups. Such passage will, however, if it is to be at all reliable, necessitate very accurate instruments which measure very specifically the two factors involved, namely school achievement and mental achievement. The present attempts in this ambitious direction, involving as they do all the errors characteristic of both types of measurement must be taken *cum grano salis*. Especially is this true when the very tests by which we measure school efficiency are themselves being used with satisfactory results by other experimenters, to measure the other variable—namely, intelligence itself. Thus, for example, the National Intelligence Test employs a fundamentals test as a measure of intelligence. Pintner<sup>7</sup> using a non-linguistic test is less subject to criticism than Monroe and Buckingham; but a careful consideration of the inaccuracy of the two measurements, intelligence and school achievement, together with the fact that we are certainly measuring to no small degree the same factors, should make us very careful in interpreting such results at their face value, for the individual pupil.

The same criticism regarding reliability applies to the work of Monroe and Buckingham in the Illinois Examination. Here crude scores are transmuted into achievement ages, from which they pass to achievement quotients. To overcome the difficulty that the high scoring pupils in the higher grades score more points than the norms for thirteen and fourteen years, the authors are compelled to resort to the hypothetical achievements of age groups which cannot be obtained empirically. This extrapolation is carried almost to the limit when for a particular crude score in arithmetic we find on transmuting it into achievement age that it corresponds to a performance of 25-year-olds.

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<sup>7</sup> Pintner says that for 300 children, ranging from the third to the sixth grade a correlation of .47 was obtained between his mental index and the I. Q. on the Stanford-Binet. For the purposes for which he uses his indices, even allowing for the unsatisfactoriness of the Stanford-Binet as a perfect criterion, it seems hardly justifiable, considering the range of the group tested, to say, as he does, that such a relationship is "very satisfactory." If there is the same unreliability for the educational index the ratios must be exceedingly unreliable.

The significance and accuracy of such achievement ages, dependent as they are on assumptions with reference to the normality of distribution or upon extrapolation are much open to question. Seeing that there is so much difficulty in determining the standard scores, for a random group of (let us say) twelve-year-olds, which actually exists and can be subjected to testing, it would seem that any device which demands assumptions with reference to the scores of seventeen and eighteen year groups, could hardly be considered a permanently satisfactory solution. Moreover, there is again the difficulty in interpretation. In considering the achievement in an arithmetic test, how few of us are helped at all by saying that two performances are separated by an amount characteristic of the difference between sixteen year and twenty-three year old standing.

Buckingham<sup>8</sup> has made the suggestion that in the attempt to procure ease of interpretation we should call, by agreement, the median achievement of Grades VIII, VII, VI, etc., 8, 7 and 6 respectively. While this procedure is attractive in its simplicity, it suffers from the great drawback that it is impossible to refer the high scores of Grade VIII and Grade VII to any standard; they exceed 8 and we can only have by doubtful extrapolations a 9, 10, 11, or 12, for hypothetical groups. The suggestion of this present paper is to combine some of the merits found in the devices of McCall, Buckingham and Pintner, particularly the last, with certain other factors to accomplish the end of securing an obvious interpretation of any transmuted score, expressed in terms which make it readily applicable to the school and administrative situation. This suggestion is to transmute the crude scores of the test, into the mid-year distributions of the various grades.

This procedure will be made evident by reference to Table I which was obtained from limited data on the four tests comprising the Chapman Class Room Products Test.<sup>9</sup> In this examination battery the four tests are: (1) arithmetic fundamental

<sup>8</sup> Buckingham, B. B. "Suggestions for procedure following a testing program," *Journal of Educational Research*, 2: 787-801, December, 1920.

<sup>9</sup> Published by the J. B. Lippincott Company.

(A F); (2) arithmetic problems (A P); (3) reading selections (R S); (4) reading continuous (R C). For each of these tests and for the total for Grade V, VI, VII, VIII the achievement at mid-year for the nine equally increasing (with generous assumptions!) levels, 0.4 sigma apart, are shown. These levels are given the descriptive designation shown in the first column, and the quantitative designation ranging from 1 to 9, shown in the second column. Whether mid-year or end-year standards are chosen is a matter of agreement. For tests of skill which are the result of long training, the former is advantageous; for tests of informational material which is acquired in a single grade the end-year standard is referable. Assuming mid-year standards as given, suppose a pupil in Grade VI scores on the total test 47 points. By referring to Table I, it is possible to determine the levels of achievement for Grade VI, VII or VIII. In the case considered, it will be seen that the particular pupil's achievement is sixth-grade high or VI-7. This will be the usual status wanted. Where, however, for purposes of regrading the desire is to discover the place of the pupil in Grade VII or Grade VIII, it can be readily seen from the table that his score corresponds to seventh-grade median or VII-5, and to eighth-grade medium low or VIII-4. This illustration brings out an important merit of the proposed system of reporting. Those who are working in the schools with these measuring instruments are trying to break down certain ideas concerning the present system of grading, particularly the notion that a grade represents a narrow level of achievement of a homogeneous group. The most powerful instrument to employ in attacking this problem is one which shows on its surface the extent to which overlapping of the grades is present. This the suggested system is well calculated to accomplish; for when the transition is made from the crude scores to the equivalent scores, a momentary examination of the table shows that the same crude score may be characteristic of different levels of achievement in different grades. The proposed scheme focuses attention upon grades and the wide range of achievement in a grade, rather than on a distribution in terms of

TABLE I.—NINE LEVELS OF ACHIEVEMENT FOR EACH GRADE AT MID-YEAR.  
CHAPMAN CLASSROOM PRODUCTS SURVEY TESTS.\*

Descriptive Designation	Quantitative Designation (approx.)	GRADE V			GRADE VI			GRADE VII			GRADE VIII											
		A.	B.	C.	A.	B.	C.	A.	B.	C.	A.	B.	C.									
Indeterminate	9+	13+	10+	12+	13+	38+	17+	15+	15+	18+	57+	18	21+	16+	20+	67+	18	22+	18	22+	71+	
Highest.....	9	95	12	9	11	12	37	16	14	14	17	56	17	20	15	19	66	18	21	17	21	71
Very high....	8	88	11.5	8	10	11	34	15	12	12	16	51	16	5.17	14	17	61	17	18	16	20	65
High.....	7	79	11	7	9	9	31	14	10	11	14	47	16	15	13	16	56	16.5	16	15	18	61
Medium high.	6	66	10	6	8	7	28	13	8	10	12	42	15	13	12	14	52	16	14	13	17	57
Median.....	5	50	9	5	6	6	25	12	7	8	10	38	14	11	10	12	47	15	13	11	15	52
Medium low..	4	34	8	4	4	4	22	11	6	6	9	34	13	9	8	10	43	14	11	9	13	47
Low.....	3	21	7	3	3	3	19	10	5	4	7	30	12	7	6	9	39	13	9	7	11	43
Very low....	2	12	6	2	2	2	16	9	4	3	5	26	11	6	5	8	35	12	8	6	9	38
Lowest.....	1	5	5	1	1	1	13	8	3	2	3	22	10	5	4	5	31	11	6	5	8	34
Indeterminate	1-	4-	0	0	0	12-	7-	2-	1-	2-	21-	9-	4-	3-	4-	30-	10-	5-	4-	7-	33-	

\* A. F. = arithmetic fundamental; A. P. = arithmetic problems; R. S. = reading selections; and R. C. = reading continuations. A. popl. of Grade VI scoring 10 on reading selections and receiving 47 as a total score has his score recorded as VII-6. If reference is to Grade VII, these scores are both recorded as VII-6.

a single population. Of course, the wide variations of achievement on the continuous scale show the same thing, but do they show it as obviously? We have already made the point that the thinking of the practical schoolman is in terms of grades, and that eventually children, as the result of the tests, have to be placed in grades. There is, however, a further reason why standardization by grade groups rather than by age groups should be given preference. This is found in the fact that the subjects in which we test are taught by grade rather than by age. By this is meant that a certain part of history or civics is taught to Grade VII and Grade VIII and not to 13- or 14-year-old groups. It seems disadvantageous to use as the standardizing group a population such as McCall's of which a considerable portion have never been exposed to the instruction in the elements out of which the test is constructed. While this criticism applies much less to examinations in reading, and to wide examinations in arithmetic, yet in specific elements in arithmetic taught in later grades it is certainly very pertinent.

We shall make no attempt to pass above the 95 percent point which is called 9, because the data, unless originally very great in amount, are becoming so attenuated at this point that reliability is out of the question.<sup>10</sup> Where the score passes beyond that of the 5th or 95th pupil at the extremes, it may well be left indeterminate, calling it 1— or 9+. To refuse to pass beyond these points and to leave the rating indeterminate if less satisfying is at least an intellectually honest procedure.

For each grade there are thus nine levels each separated by equal amounts. These for any particular grade, such as VI, are written VI-1, VI-5, VI-9, etc. Together with the indeterminate levels, VI-1 — and VI-9 +, there are thus eleven levels for each grade. If the data are sufficiently homogeneous and extensive to justify the process, we may insert intermediate steps with suitable descriptive terms and with quantitative designation, e. g., 1.5, 2.5, 3.5, etc., up to 8.5. This would furnish nineteen levels of achievement.

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<sup>10</sup> Yule, G. Udny. *An introduction to the theory of statistics*. (Fourth edition.) London: Charles Griffin and Company, p. 341.

When very fine correlation work has to be done with the transmuted scores, it will of course be necessary to work to smaller limits than those afforded by the eleven or even the nineteen levels. This however will be a simple matter of interpolation and extrapolation. We can readily decide not only the achievement of VI-5 or VI-6, but also the achievement of VI-5.2, VI-5.3 or VI-5.4.

When dealing with an extreme case falling beyond the equivalent of 9 for a particular grade, it is surely better to pass to a higher group and place the case in that, than to rely on very inaccurate points at the end of a distribution, as McCall is compelled to do. If a pupil in Grade VI falls in VI-9 +, it is obvious that he is out of place, and that by referring to the distribution of the higher grades, we can see where he fits. If, however, we are giving tests to measure improvement, the scores of the few pupils at the two extremes would have to be given special treatment.

When it is desired to work in age groups, the same procedure as that above advocated would be recommended. Here the prefix would be in Arabic instead of Roman numerals, e. g., 12-5 would indicate the median achievement of unselected pupils in the neighborhood of 12 years old. Roman figures would always indicate grades, and Arabic figures would indicate ages. Meanwhile, seeing that almost all thinking takes place in grades, particularly when the problem is that of regrading, it is well to establish the grade norms first rather than the age norms. If, however, we wish to make comparisons from country to country, there is much to be said for age norms. Certain English writers, for example Ballard, are making the appeal for age norms for the simple reason that they do not understand the American grading systems.

In the matter of intelligence tests where primarily the thinking is done in age groups, the above convention would also apply. The Arabic figures would represent the age and the figure following would indicate the level of achievement. In certain cases where the measures of intelligence were very reliable, it might

be necessary to establish by interpolation or experimentally intermediate achievements. For example for pupils 10 years, 6 months the designation might be 10.5-7.

The same convention as to grades could be extended beyond the elementary school, the various years of high school being given the designation IX, X, XI, and XII, and the corresponding levels for each high-school subject determined.

When the main interest is in measuring improvement, particularly over short spaces of time, rather than in regrading, the equally spaced steps of any of the various grade levels may be used. Other things being equal, grade VII levels would probably give the most useful system of units. In those cases where the desire is to measure over a longer period, say a number of years, two alternatives present themselves. In the first place, we may measure the improvement discontinuously in terms of the different grade levels. An advancement from VI-5, to VII-5 would represent a year's improvement, in the same way as an advance from VII-7 to VIII-7 would represent, neglecting selection, a normal year's growth. In fact, when measured in these terms ease of interpretation and usefulness of information are at a maximum; for when merely grade averages are reported, as a test is repeated from year to year, little attention is given to those that exceed the average, largely because there is no ready method of checking up their degree of improvement. When, however, we have the various levels for the different grades established, interpretations of degrees of improvement of pupils far removed from the median will be readily possible. Thus a score increase from VI-9 to VII-9, will be just as good for a pupil of the nine level, as a jump from VI-5, to VII-5 will be for a pupil of the median level.

If, however, a continuous scale is demanded—and physical measurement suggests that in those few tests which are applicable to a wide range of grades, such a scale is the ideal—I would suggest that we use the total population of grades five to eight, employing unselected children at mid-year from these four grades in equal number. Considering these groups as a single population,

we may determine the nine levels, or for finer grading the nineteen levels, in the same way as with a single grade group. It would be necessary to have some designation for such a series of steps. Perhaps U. S. might be used, the letters standing for "Universal Scale."

Such a combination of 100 unselected pupils from each of the four top grades at mid-year has been made for the above mentioned test, with results as shown in Table II. This combination of 400 is treated as a single group, and the nineteen levels of achievement in the totals of the four tests are exhibited. In this way we get a scale which is continuous in the same way as McCall's but which is less subject to the censure that extreme scores cannot be scaled. Furthermore, it is derived from a population which can readily be obtained for testing purposes. Only in a few of the wider tests, reading *par excellence*, could this broad population be used. Otherwise the procedure would be subject to the same criticism as is McCall's, in that we should be standardizing our scale on a population a large section of which had been given very little or even no chance to score in the test. The fact that in the narrower tests we are compelled to use short scales, which, so to speak, break at various points, is probably inherent in our problem. The physical analogy of the yard stick, while suggestive, is not really applicable. There is continuity, for example, in height within any group, say twelve-year-olds; but the same is not true for knowledge of civics, or of interest in arithmetic. Here we strike the problem of the undistributed zero.

To avoid misunderstanding, it is perhaps well in closing to point out explicitly two demerits of the universal scale procedure. The first is found in the experimental fact that grade groups are less constant than age groups in achievement. This is caused by differing procedures with reference to promotion from system to system. The second disadvantage is that in dealing with grade groups, standardization must take place at some definite point in the history of the grade, presumably either at mid-year, or at end-year. In contrast to this limitation, standardization by age

groups can in the general case be done at any time. Neither of these drawbacks is sufficient to prevent the procedure from being used. The first point has already been met; whatever norms are obtained will always be subject to greater inaccuracy than will be produced by varying standards of promotion. Probably care

TABLE II.—A UNIVERSAL SCALE<sup>a</sup>

DESCRIPTIVE DESIGNATION	PER-CENTILE (approx.)	QUANTITATIVE DESIGNATION, EQUIVALENT SCORE	CRUDE SCORE
Indeterminate highest.....	..	US-9+	68+
Highest .....	95	US-9	67
	92	US-8.5	63
Very high.....	88	US-8	60
	84	US-7.5	57
High.....	79	US-7	53
	73	US-6.5	50
Medium high.....	66	US-6	46
	58	US-5.5	43
MEDIAN.....	50	US-5	40
	42	US-4.5	37
Medium low.....	34	US-4	34
	27	US-3.5	31
Low.....	21	US-3	28
	16	US-2.5	25
Very low.....	12	US-2	23
	8	US-1.5	21
Lowest.....	5	US-1	18
Indeterminate lowest.....		US-1-	17-

<sup>a</sup> Totals in the Chapman Classroom Products Tests at the various levels. Population, 100 unselected pupils from each of Grades V to VIII. A pupil scoring 53 is recorded as US-7.

will have to be taken to secure standardization material from school systems in which the age-grade tables are reasonably normal. The second point raises a real difficulty but not as great as that which will have to be met in combining age groups, a procedure to which I believe, McCall will have to resort if his scale is to be at all reliable at the extremes. To secure unselected twelve-year-olds is within the bounds of possibility, but the higher unselected age groups can probably not be attained and the low unselected age groups will bring in the problem of the undistributed zero.

#### SUMMARY

This paper presents a scheme of reporting test scores whereby, after the transition has been made from the crude score to the equivalent score, the latter bears, upon its face, an obvious and useful interpretation.

Nine equally separated levels of achievement for each grade are set up. These levels for a particular grade being referred to as VI-4, VII-8, etc. In addition to this quantitative rating, these nine levels are given a descriptive designation.

For age groups, the same method of report applies, Arabic numerals replacing the Roman numerals.

Intelligence levels at all ages admit of treatment by the same method.

Where a continuous scale is demanded, the mid-year Grade-VII scale is suggested. If this is not wide enough, an unselected population consisting of the four top grades (at mid-year) in equal number is recommended. This is treated as a single group and the same nine levels determined. If the data are extensive, these nine may be extended to seventeen or much further. The designation for a level of such a group is US-5, US-8, etc.

In every case the figure or letter before the hyphen signifies the group to which reference is made, the figure after the hyphen indicates the level attained.

## AN ACCURATE INDEX OF NATIONALITY

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Many studies published during the last decade have included in their findings data relative to nationality, and from these data some wide-spread conclusions have been drawn. In most cases, the authors of these studies have not themselves been disposed to attach too much importance to their findings, since they realize the imperfect character of the data; but the serious factor has been that these findings have been quoted aside from the context, and so have given rise to inferences not always justified by the facts. Therefore, when it becomes possible to point out methods of procedure productive of more accurate results, a check is obtained by which these inferences from past studies may be verified or invalidated.

Certainly, one of the most important elements entering into the whole matter of nationality investigation is the reliability of the index used to establish the nationality factor. In school surveys, the usual method has been to determine the nationality of the father of the school child; and the assumption has been that the nationality of the child is exactly determined by the birthplace of the father. Now several questions immediately arise as to the validity of this method, especially when, as in the case of school children, it is desired to determine the general influence of the home background. Two of these questions seem especially pertinent: first, does the birthplace of the father really indicate the national background of the child; and second, does the father's influence in the home determine the language spoken in the home, so that it is fair to conclude that the language there spoken is the native tongue of his place of origin?

In working out a recent study of the relationship borne by various nationalities of school children to their progress,<sup>1</sup> data were collected which make it possible to give a partial answer to

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<sup>1</sup>R. H. Jordan, *Nationality and School Progress*. Public School Publishing Co., 1921.

these questions. The investigation was carried on in the cities of Minneapolis and St. Paul, where the population is sufficiently polyglot to justify considering these cities as typical of the inland centers of population. In all, 2653 cases of school children were studied, and data were collected with reference to the birthplaces not only of both parents of each child, but also of the four grandparents. In 2607 cases the birthplace of the father was determined, and in 2491 of these, of the four grandparents as well. The nationality of the child was based upon the place of origin of his grandparents, according to the following method. The birthplaces of the parents were disregarded, and the child was listed as belonging to that nationality shown by the predominating number of agreements of his grandparents. That is, if all four grandparents were born in some one foreign country, the child was listed as being of that nationality; or if three were of one nation and one of another, or two of one nation and the other two of different nations, the majority of grandparents determined the nationality of the child. But where there was no predominance, as where two were born in one country and the other two in another, the child was regarded as of "mixed" nationality, and so was not included in tables of comparison. To make the matter clearer, if all four grandparents were Norwegian, or if three were Norwegian and one Swedish, or if two were Norwegian, one Swedish, and one American, the child was listed as Norwegian. But if two were Norwegian and two were Swedish, he was listed as of mixed origin. Thus, a comparison can be made between the results secured by listing children according to the birthplaces of the fathers, and the results obtained from using the places of origin of their grandparents. Table I shows the comparative results.

No close analysis of this table is necessary to make clear two points: first, that there is a fairly close agreement between the foreign-born groups, and second, that there is no agreement at all between the American-born groups. Accordingly, it may be inferred that the birthplace of the father is a fairly accurate index of the origin of the child if the father is foreign-born, but

TABLE I.—NATIONALITY OF CHILDREN ACCORDING TO BIRTHPLACE  
OF FATHER AND ACCORDING TO BIRTHPLACE OF TWO OR  
MORE GRANDPARENTS

BIRTHPLACE	FATHERS	TWO OR MORE GRANDPARENTS
United States.....	977	350
Great Britain.....	149	165
Germany.....	104	177
Norway.....	209	215
Sweden.....	422	420
Austro-Hungary.....	142	129
Roumania (Jew).....	115	99
Russia (Jew).....	340	336
Poland.....	22	38
Finland.....	43	45
Denmark.....	34	22
Italy.....	19	18
Miscellaneous.....	31	20
Mixed origin, no pre- dominants.....	...	457
	2607	2491

that it is not at all an index if the father is born in the United States. Therefore, whenever there is any comparison of foreign nationality with Americans, the father's birthplace cannot be taken as a fair index of the real ancestry of the child; and such comparisons must be based upon more accurate information. But when comparisons are made between national groups where Americans are excluded, the birthplace of the father may be considered as a rough index of the child's ancestry. An objection is frequently made that it takes too much time and trouble to obtain the data relative to grandparents; but it may be pointed out that the method ordinarily employed, namely, having a card filled out at home by the child's parents, will involve but little more time or trouble, if the parents are asked to include as well the birthplaces of grandparents.

A study also was made of the relative influence of the father and the mother in determining the language spoken in the home. The cases were classified into five groups as follows:

i. American born father, foreign born mother:

Both speak English at home.....	84
Both speak foreign language.....	13
Father speaks English, mother her native language....	14

2. Foreign born father, American born mother:	
Both speak English.....	139
Both speak foreign language.....	61
Father speaks native language, mother speaks English	9
	— 209
3. Both foreign born, one of one country, one of another:	
Both speak English.....	52
Both speak father's language.....	21
Both speak mother's language.....	13
Father English, mother native.....	5
Father native, mother English.....	5
Each original language, unchanged.....	13
	— 109
4. Both foreign born, in the same country:	
Mother speaks English, father native.....	6
5. Both born in the United States:	
Father speaks English, mother a foreign language....	2
Mother speaks English, father a foreign language....	1
Both speak a foreign language.....	21
	— 24
Total Cases .....	459

A summary of the above cases shows that in 166 the father has seemed to dominate since his native language has been adopted as the home language; and in 165 the mother has seemed to have the greater influence. In 36 cases the original differences of birth have persisted, there being "no compromise." In 55 cases the father and mother speak different languages in the home. Of the 115 foreign-born cases where both parents are foreign-born, only five fathers speak English at home when the mothers retain the native tongue, but eleven mothers speak English while the fathers use their native language.

Naturally, the conclusions to be reached are largely colored by two great factors, first, the natural tendency to pick up and to use English in an English-speaking community, and second, the tendency to continue the use of the foreign language where grandparents are resident in the home. In the latter case, the influence of the father might frequently be neutralized by the presence of his wife's foreign-born parents, and vice versa. However, these factors do not affect the main point, *i.e.*, that the

evidence shows rather conclusively that the father is by no means to be assumed to be the predominating influence in determining the atmosphere of the home. Rather must it be concluded that the mother is at least quite as influential, with the general preponderance in her favor. All of this seems to demonstrate that there is no good ground for assuming that the birthplace of the father is any clear indication of the language spoken at home.

From these two studies, there seems to be no doubt that for the groups studied, national comparisons drawn on the basis of the father's place of birth would be very largely erroneous and misleading. Inferentially, a similar doubt would be placed upon all conclusions drawn from data collected without further knowledge than the origin of the father. Since but little more time or trouble will be involved in getting all of the needed data, is it too much to ask that in future, the studies of school children involving nationality be based upon the birthplaces of their grandparents?

## Editorials

### WHAT IS A PUBLIC SCHOOL

In England nine institutions have been known for many years as the Great English Public Schools. They charge exorbitant fees and cater to the *élite*. Satirically—and with the half truth that makes satire effective—it has been said that they are called *great* because they limit their ministrations to a few highly-selected students, *English* because Greek and Latin constitute the core of instruction, *public* because none but the rich can attend, and *schools* because the chief interest is football and cricket. A few institutions in this country resemble these aristocratic corporations. But we do not call them public schools; and not many of us think of them as great. English, however, they may be.

In this country a public school is free and tax-supported. But it should be much more. It should serve the public and should be understood and admired by the public.

Not long ago the writer visited a school system in a peculiar community. A fine progressive spirit was evident among the teachers and supervisors. Modern buildings were either available or under construction. Good teaching was being provided. The schools, however, were isolated. Their lines of communication with the public were insufficiently maintained. No parent-teacher organization was in evidence. Though the teachers were carefully selected and manifestly of good ability, their contacts with the community appeared to be few. They seemed to be living unto themselves. Their social talents, which were of a high order, were exhibited for the most part to each other.

Such a school falls short of being "public" in the best sense. It is likely either now or later to suffer from a lack of the material support without which good teaching, good buildings, and good

equipment cannot be purchased. Moreover, it will have little of that larger influence upon the life of the community which is at once its privilege and its duty. Children will be sent to school because they must be sent; but, they will be withdrawn as soon as the compulsory age is passed, and during their attendance the teachers will be unable to count on parental support. With the school and home working independently of each other or at cross purposes, even the narrower objectives of the school will be relatively unattainable. The progress of pupils will be slow, and elimination will be high. Boys and girls too old for their grades will be numerous, and the membership of the high school will be small.

On the other hand, the public will be deprived of the good influences of a real public school—of a school which reaches out into the community, shares its best endeavors, and gives momentum to its best impulses. In the district where the school is conducted behind closed doors, the business man complains most loudly that children can no longer spell or add or write grammatically. The "best citizens" and their wives regard school teachers as socially impossible, while by others they are regarded as snobs. And the pity of it is that both characterizations tend to become true as the school continues to hold itself aloof from the people.

The public, and the school must, therefore, be brought together. The public is really tremendously interested—or will be if its attention is called to its interests. It provides both the money and the children; and these constitute at once the essentials of the school and the people's dearest possessions. It would seem, therefore, that only through the existence of really unnatural conditions can the school and the people be estranged or even become indifferent to each other. Wherever such conditions have insensibly developed, it should be the first care of school people to banish them.

That school is truly a public school which is not only free and tax-supported but which is also operated as a high public trust. Such a school will render continuous account of itself to the pub-

lic; it will take the public fully into its confidence; it will assert and maintain, on the basis of undisputable worth, its right to lead and its ability to inspire. When a crisis comes—when agitators or obstructionists arise, or when business depression reduces valuations—such a school will be protected. Aristocrats will send their children to it instead of to exclusive private schools. Fathers and mothers—aristocratic or otherwise—will wish their children to enter it at an early age and remain in it as long as possible. They will speak well of the school and second the efforts of teachers. Undoubtedly one of the best ways to reduce retardation and elimination is to begin with the parents. Many a school system which has been surveyed and found wanting needs nothing so much as to become a real public school.

B. R. B.

#### THE PRINCIPLE OF RANDOM SAMPLING IN SUPERVISION

One big difficulty in supervision is that the supervisor is not ubiquitous. He cannot be here and there, too; and if he is here today he must be there tomorrow. If he has lately given attention to arithmetic in the sixth grade, the next time he comes around he will have to hear some reading or look over a set of spelling papers. It is hard to give consecutive attention to any particular type of work long enough to effect improvement.

Standardized tests, however, have multiplied the hands of the supervisor. He may not appear in the classroom as often as he used to—nor as often as he would like to; but he may be keeping track of things far better than formerly. Contemptuous reference to the "office superintendent" means nothing unless we know what he is doing in his office. He may be making effective use of some of the devices of statistics, either in conjunction with standardized tests or without them. We called attention in a recent issue to an application which he might make of the median.

Another statistical principle that will help the supervisor is that of random sampling. Let him rate the forty pupils of a class in any subject, and then let him select at random the ratings

of ten pupils. He will probably be surprised to find how closely the average of the ten ratings corresponds to the average for the entire class. He may therefore use the ratings of the ten as a fair substitute for the ratings of the forty unless individual ratings are required. It is true that a random selection occasionally yields a result which differs materially from the true result. But the ease with which the method may be applied makes it practicable to obtain many determinations. Since the vast majority of these will be close to the true determination, no serious error will be involved.

Suppose a principal is seeking the most effective way to stimulate pupils to greater skill in written expression. Undoubtedly, he will entertain the idea that if the effort could be kept up, the maximum result would be obtained by securing a little writing every day from every pupil. But he will readily see that for a teacher to read and to rate a set of compositions every day, even if they were very short, would be too much to expect. At least it would be too much to expect unless he were willing to allow other subjects to be neglected. And even if a teacher could rate a short composition a day from every child, it would be clear to the principal that it would be impossible for him to review more than a very few of these papers, perhaps not more than those of three or four classes daily.

By the use of the method of random sampling, however, and with a little planning, the principal may attain surprising results in the personal supervision of English composition. The following method has been tried. Let from ten to fifteen minutes per day be devoted to English composition by each class. Such a part of that time as is not used for discussing previous work should be devoted to the writing of two or three sentences or a paragraph on an assigned topic. After collecting these exercises, the teacher will simply endorse them with the name of the class, the date, the number of papers, and the topic on which the children have written. A pupil messenger will call for the papers together with those of other classes in the building and will take them to the principal's office. Here the same pupil, or another one, will

enter in a record book the facts which the teachers have endorsed on each package. This pupil will also draw from each package a certain number of papers (say ten). These papers are the random samplings from an inspection of which the principal will obtain a fairly accurate estimate of the work of each class for a given day. It is suggested that he read each of these ten papers for each class and that he rate each paper as satisfactory or unsatisfactory. It will in general be found unnecessary to recognize more than these two classifications—namely, satisfactory or unsatisfactory. If seven of the papers are satisfactory, the class rating is seventy. If eight of them are satisfactory, it is eighty. After the random samplings for each class have been examined and rated in the manner indicated, the principal will indorse the rating on each package and enter it after the name of the class in the record book. The packages will then be returned to the teachers.

By this means, it has been found possible for a principal to give close attention to the work of as many as twenty-five classes without an undue expenditure of time. The amount of improvement in English writing which has resulted from the use of this device has been exceedingly gratifying.

This, however, is only an illustration. What we wish to convey to the reader is first, that a number of statistical principles may be used by the teacher and especially by the supervisor with very gratifying results, and second, that the method of random sampling is a device which is particularly effective and distinctly economical of time.

B. R. B.

## Reviews and Abstracts

JORDAN, ARTHUR M. *Children's interests in reading.* (Teachers College, Contributions to Education No. 107) New York: Teachers College, Columbia University, 1921. 143 pp.

This is a study furnishing facts of deep significance to all who are in any way concerned with the reading of children from nine to eighteen years of age. In stating the purpose of the study Dr. Jordan writes as follows:

"The abiding interest of school children in their subjects of study has for many years been one of the criteria of good instruction. In classes in literature this becomes a problem of peculiar interest. . . . If we could determine what the child's major interests are, be those interests good or bad, it would be possible to direct these forces along lines which are desirable. If not directly, at least indirectly, we could connect the subject with his interests and show how this subject is related to these interests. Psychologically this interest would strengthen the connections between the bonds formed in the reading of good books. Thus what has been learned would be longer remembered. In the second place there would be more possibilities for secondary neurone connections, that is, interest in reading would lead on to greater interest."

After a review, comparison, and criticism of previous studies along this line, the author explains his investigations by the questionnaire and library methods. The reader is impressed throughout with the care with which the study was planned and with the scientific methods used in carrying it out, in compiling the data, and in arriving at the conclusions.

Most striking evidence is given of the pronounced sex differences in the choices of books and magazines. The tables show also the strength of the various interests from year to year and the relative popularity of the most popular books as influenced by sex and by age. In a careful interpretation an analysis is made of the causes of these differences. The correlations obtained between the results of the different investigations show clearly the large differences between the sexes in their liking for books—these differences being greatest at the ages of twelve to thirteen in the cases of both books and magazines. "The magnitude of these differences is, finally, in no small degree determined . . . first by the boys' great interest in books of adventure and in the magazines of adventure and of science; and by the girls' preference for books of fiction and for magazines of fiction and woman's arts."

Altogether, this is an illuminating study of which extensive application should be made in literature courses, in the compiling of reading lists, and in the writing of books for young people.

MYRTLE L. KAUFMANN

*Elementary Supervisor, Logansport, Indiana*

TRYON, ROLLA MILTON. *The teaching of history in the junior and senior high schools.* New York: Ginn & Company, 1921. 294 pp.

This book on the teaching of history in the junior and senior high schools fulfills a long felt want for a book bringing together many concrete suggestions and devices for the teacher of history. It will be particularly helpful for the beginning teacher who faces the problem of organizing several courses in the various fields of history.

The chapters giving suggestions on methodology are very helpful. They describe at some length the history recitation; detail ways and means of teaching pupils how to study history; analyze and evaluate special methods of procedure such as the lecture, topical, textbook, source, and problem methods of presenting subject matter. The book also comments upon written work in history, such as, the permanent notebook, the collateral reading done in the library, and the term paper.

Some of the other chapters in the book are not as concrete as those dealing specifically with methods of teaching. For example, the section on Progress within the Subject, does not clearly set forth differentiating principles for the allotment of subject matter to each grade. The chapter on Measuring the Results of History Teaching would have been of more service if it had suggested which of the standardized history tests to use, and how to interpret results so obtained.

A very important section in the book, particularly for the new teacher, is the one on Planning the Course and the Lesson. In the opinion of the reviewer this chapter could well have been expanded. Concrete proposals are made concerning the main and subordinate topics to be covered in the course and illustrations of daily lesson plans are given. They indicate the importance of a daily outline including important events, persons, and dates; further references; maps; and pivotal questions and exercises. Such suggestions should stimulate teachers to work out an efficient method of organization and also make the daily teaching of history more pleasant.

It is to be regretted that certain of the much discussed psychological aspects of history teaching are not discussed in the book. We need a discussion concerning the place of association in history teaching, and answers to such learning problems as (1) how much repetition is necessary to "fix" important historical facts? (2) How can we stimulate and train the imagination and judgment in the teaching of history? The little research done thus far on the psychology of history has not been reported in sources available to the average teacher. Books presenting material on the teaching of history should at least summarize this data.

The reviewer agrees with the statement in the preface of the book that while there are many ways of teaching history, it is fundamental to educational method that the teacher know that there are a number of ways of doing a multitude of things connected with the everyday procedure of that subject. This book tells the teacher of history about many of these ways and points out a procedure in managing them.

EARL W. RUGG

*Columbia University*

DAVIS, SHELDON EMMOR. *The technique of teaching*. New York: The Macmillan Company, 1922. viii + 346 pp.

This book, like several of its type, has for its purpose the improvement of teaching. The preface states: "Its professional purpose is to analyze classroom activities which the instructor may have performed mechanically without being conscious of principles involved, to afford opportunity for intelligent evaluation of procedures in common use, and to suggest as diversified methods of presentation as the limits of one small volume render possible."

The first chapter discusses the general principles of the technique of teaching. Each of the remaining six chapters is devoted to the teaching of one of the fundamental subjects, as follows: spelling, reading and literature, composition and grammar, arithmetic, history, geography. The first chapter gives brief discussions of several well-known principles. It is doubtful whether this chapter will be of much value to the novice owing to the brief and sketchy manner in which the principles are discussed. The well-trained teacher is already familiar with such conceptions and the discussions will add little to her stock of ideas. It seems to the writer that the book would be of more value if it contained a more elaborate discussion of the principles in light of classroom activities. A teacher who has been performing these activities mechanically would scarcely gain sufficient background from a study of this book to interpret the principles underlying such instruction.

It is surprising to find so little attention given to recent experiments in education. The discussions on teaching the various subjects are quite similar to those in several books that have been in rather wide use for a number of years. The justification for a new book on methodology would be that it would incorporate the results of our latest and most comprehensive experiments. Owing to the scope of the book, the discussion of the teaching of each subject is much less detailed than one finds in books which are entirely devoted to the teaching of one specific subject. This, however, could be justified if the material presented were of a different type. The exercises at the end of each chapter are deserving of special commendation. They show evidence of careful thinking. They should be provocative of thought and would furnish an excellent basis for class discussion. From the writer's point of view these exercises are the most valuable portion of the book. If the book succeeds in interesting more people in the improvement of the technique of teaching, its publication may be justified. Aside from the exercises, however, it is questionable whether the book is a contribution to the teaching process.

*University of Wyoming*

C. R. MAXWELL

PRYOR, HUGH CLARK and PITTMAN, MARVIN SUMMERS. *A guide to the teaching of spelling*. New York: The Macmillan Company, 1921. 151 pp.

The authors have prepared a manual on the teaching of spelling primarily for the inexperienced teacher. It consists of three main divisions: fundamental principles; methods, materials, and devices; and a bibliography.

From the viewpoint of the major function of the manual, the most valuable features are the chapters on the "best methods," on devices, and on ques-

tions often asked by teachers. These features are discussed in simple language in terms of the underlying principles that have been recently formulated by scientific researches. This method of presentation is commendable because it tends to keep the amateur teacher from the rut of "blind imitation."

The chief negative criticism of the three foregoing desirable features of the manual is the meagerness of illustration. For example, it is questionable whether there are enough illustrations of the "best methods" to make each one of them clear to a beginner in the field. Not only from the standpoint of clearness, but also from that of the felt needs of the amateur teacher it would seem that more illustrations might well have been given of the "best methods," of the materials, and of the devices. The popularity of the publications devoted to devices supports the latter reason for more illustrations.

There is a tendency for the authors to cater to the technical demands of the investigator in the field of spelling. For example, note the detailed presentation of "A Suggested Minimal Spelling List" on pp. 79-85 and the extended bibliography of 78 titles at the end of the manual. Such lapses from the primary purposes of the manual would not seem to enhance its value to the inexperienced teacher.

May we offer two other negative criticisms? First, we fail to see why the chapters were not numbered consecutively. Second, minor errors or editing have been overlooked. For example, in the Table of Contents, p. viii, the Bibliography is not given as Part III, where as it is so given on p. 137; and on p. 28 the word "Interest" in black face should be an "inset" in the last paragraph instead of in the one in which it appears.

However, regardless of these criticisms the inexperienced teacher will be well repaid in suggestions gained by reading the manual.

A. G. CAPPS

*University of Missouri*

THORNDIKE, EDWARD LEE, *The new method in arithmetic*. Chicago: Rand McNally and Company. 1921. 260 pp.

A long time ago we all learned from our readers that for want of a nail a shoe was lost; for want of a shoe a horse was lost; etc. In this book Professor Thorndike is not too big to be above the nails of arithmetic. Nor does this by any means imply that ample recognition is not given to thinking and applied superstructure. Some given to dialectics may wish to argue whether or not the school should be more cultural or more disciplinary, more academic or more vocational, et cetera, but the implications of the foregoing have validity only if and when children can add, subtract, multiply, divide, measure and weigh, handle commonly used fractions, compute interest and taxes, discriminate in investments, and intelligently appreciate numerical relations in the problems of farm, industry, business, and travel.

"The New Methods" exemplified are based upon "principles discovered by the psychology of learning, by experimental education, and by the observation of successful school practice." The chief concern of the author is not a defense of past procedure but a vigorous advocacy of the best principles derived from careful experimentation. We all know how comfortable the old shoe is,

but there comes a time when we must step out with the new pair. The Thorndike Arithmetics (Rand McNally) are used throughout for illustrative purposes but "transfer" has a mighty effect with any modern set of good texts. The book is constructed from the point of view of the working teacher who may have little direct knowledge of psychology. There is abundance of detailed illustration and application and further end-of-chapter exercises. College and Normal classes should find much dynamic material in "New Methods."

Chapter headings give intimation of the pragmatic character of the book and the following are typical: Reality; Interest; Theory and Explanations; Habit Formation and Drill; Solving Problems; Teaching as Guidance; Some Hard Things; Some Common Mistakes; Some Instructive Disputes; Tests and Examinations. Under what simpler or more sensible doctrine could a method book in arithmetic be launched than with the prelude: "The older methods taught arithmetic for arithmetic's sake, regardless of the needs of life. The newer methods emphasize the processes which life will require and the problems which life will offer."

"Reality" is sensed in: "The newer methods set a higher standard in the selection and construction of problems, requiring not only that they give the pupil an opportunity to think and to apply arithmetical knowledge, but also that they teach him to think and to apply arithmetic to situations such as life may offer, in useful and reasonable ways, and so to esteem arithmetic not only as a good game for the mind but also as a substantial helper in life's work." In fact the problems which "could occur in real life only in an insane asylum" are conspicuously absent from Professor Thorndike's treatment. Note the very significant contrast however when 2 times 2, 3 times 2, etc., and  $4 \div 2$ ,  $6 \div 2$  are taught as tables in connection with pints and quarts and the cost of postage stamps. And goodbye for "Denominate Numbers" as such in a separate suite. Old Measrs. Foot, Yard, Pint, Quart, and Gallon meet, mingle and strike up lasting acquaintance "bonda" right in the lobby. But when prohibition becomes firmly fixed, Professor Thorndike will be the very first to snub, arithmetically speaking, the more out-of-date members of the above family.

Two potent interests are recognized: interest in mental activity as such and interest in achievement. While the newer methods increase the strength of these two appeals, arithmetical thinking should be preserved from waste and failure due to difficulties of vocabulary and construction. Interest through achievement is most laudable, with definite tasks definitely set and with results as definitely measured and noted.

The older methods made much use of explanations based upon deductive reasoning and beyond the child's grasp. The newer methods attempt to secure real understanding of rules and principles but by an *inductive* reasoning based upon the simple premise "because by so doing I get the right answer," such answer however being submitted to verification. "The newer methods lay more stress on the pupil's surety that the rule or process is right and less stress on his ability to state in words a proof that would satisfy a mathematician." The child verifies the results obtained in  $6 \div \frac{3}{4}$  (after multiplying 6 by  $\frac{4}{3}$ ) by dividing a 6 inch strip into  $\frac{3}{4}$  inch lengths. The rule that he formulates is

verified by further examples. "Such a child understands in a certain true and useful way the reasons for 'invert and multiply' or 'multiply by the reciprocal' (supposing him to have been taught the meaning of reciprocal). He may not be able to state the deductive proof from the nature of a fraction. Neither can some of my readers perhaps!"

And so throughout the book one finds many "satisfying connections" in the Law of Effect. There is no saner or more scientifically arrived at arithmetical procedure than the progressive teacher will find in New Methods. The "examination" which really counts is fifty years long and its situations are as real and varied as are the conditions of life. Such an examination however "demands a mastery of a few real things rather than a 60 percent efficiency with many." These real arithmetical processes have no better presentation than in Thorndike's New Methods. No up-to-date school man will long be without a copy.

CYRUS D. MEAD

*University of California*

HOPKINS, L. THOMAS, *The marking system of the college examination board*. Cambridge 38, Mass.: The Graduate School of Education, Harvard University. 1921. 15 pp.

In a monograph of commendable brevity Mr. Hopkins sets forth the results of a study of the marks given by the College Entrance Examination Board during the period 1902 to 1920, inclusive. The study grew out of the Board's own desire for aid and criticism.

A total of 445,620 marks is embraced in the study. These marks represent four school subjects (English Readings, Elementary French, Elementary Algebra, and Plane Geometry), and cover a period of 19 years. As a basis for comparison, where necessary, the marks were corrected to conform to the following groupings: 90-100, 75-89, 60-74, 50-59, and 0-49. A separate distribution was then made for each subject each year, the work resulting in 76 distributions. Of these, 71 distributions proved to be bimodal with one mode always occurring in the lowest mark-group, and 70 distributions were skewed negatively or toward the low end of the marking scale. When all the marks were thrown into one "grand total" distribution the same bimodality and negative skewing appeared, and only "slight improvement" was noted when the writer prepared a special series of 20 distributions of the marks of "only those candidates who were recommended for examinations on the ground of full and satisfactory preparation."

Comparing these distributions with the normal curve the writer is "amazed at the remarkable extent of divergence." He then outlines the reading methods pursued by the examiners and offers criticisms which need not concern this review. Finally, "the suggestion is made that some approximation to the normal curve offers the best basis for solving present irregularities."

The report might have been made clearer and stronger by including a "grand total" distribution of individual marks from 0 to 100. As it stands, the reviewer is left in doubt whether the divergence from the normal curve, in the actual assignment of marks by the Board, is really as great as is repre-

sented. Examination of the writer's groupings shows that they do not embrace equal ranges of the marks assigned. Thus the first or highest group includes 11 points on the 0-to-100 scale, the second group includes 15 points, the third 15 points, the fourth 10 points, and the last one 50 points. His deductions appear to be made by comparing the percent of marks found in the first group (11-point range) with the percent found in the fifth group (50-point range), and the percent found in the second group (15-point range) with that found in the fourth group (10-point range). The "second mode" of the writer, upon which chiefly seems to rest the finding of "negative skewness," is found in the group which embraces 50 points. Some of the subject distributions show a larger percent of marks in the fourth than in the second group, but comparison of these groups in the "grand total" distribution (p. 8) shows that the latter includes about 33 percent more marks. It should also be noted that the middle group has its lower limit ten points above the mid-point of the scale.

These facts suggest that the varied ranges of the different groups may be the main factor in determining the "grand total" distribution as found, and in its seemingly marked divergence from the normal curve. The same factor appears to enter into many of the subject distributions. Such a table of "raw data" as has been mentioned might have disproved these inferences, but from the report as it stands the Board might well infer that the chief need is to push down the passing-point in its scale to some mark nearer zero.

B. F. PITTINGER

*University of Texas*

## News Items and Communications

This department will contain news items regarding research workers and their activities. It will also serve as a clearing house for more formal communications on similar topics, preferably of not more than five hundred words. These communications will be printed over the signatures of the authors. Address all correspondence concerning this department to Doctor E. J. Ashbaugh, Ohio State University, Columbus, Ohio.

The Third Conference of the Bureau of Educational Reference and Research of the University of Michigan was held Tuesday, March 28th. The program consisted of eleven ten-minute reports from workers in the field. The papers were largely grouped about the two subjects of intelligence testing and silent reading, though other phases of school work are not entirely neglected.

Superintendent Bonner Frizzell, Palestine (Texas) reports that for the past three years a local newspaper has given a full page to high-school news. This page is edited by a staff of students under the supervision of the English Department. He also reports that a special study room teacher is employed who has charge of attendance records, monthly reports, and supervision of the study hall, but does no teaching. Such an arrangement is said to be highly satisfactory.

We have received from the Superintendent's office of the Hackensack (New Jersey) Public Schools a Teacher's Manual, a Janitor's Manual, and a Bulletin on Seat Work Exercises for grades one to three. The Teachers' Manual contains the general information with which each teacher in the school system should be familiar. It is in mimeographed form but fully indexed. This fact permits easy revision and adds to the accessibility of the material. Such a manual placed in the hands of a new teacher should assist greatly in helping her to adjust herself to the workings of the system. The Bulletin on Seat Work which was prepared by the teachers should make for uniformity of such work without in the least interfering with initiative in the right direction.

The Normal College Index from the State Normal College, Dillon, Montana for March 10th is called the "School Discipline Number." The main articles in the number deal with the problems of discipline. "How Disciplinary Problems are Solved by Your Co-Educators," "The Relation of Discipline in the School to Community Life," and "Discipline in Theory and Practice" are among the subjects. It is evident that the Normal School is endeavoring through its paper to carry out to the teachers in the State some of the lessons which the instructors are giving the resident students.

Superintendent J. H. Bentley, Duluth (Minn.) Public Schools reports that during the month of February, 1922, which was not a very good month, there was deposited by the Duluth School children \$6,733.53 with a total of 18,452 deposits. On January first the total amount on deposit was \$146,509.09 with a total of 14,944 accounts. Here is another illustration of the fact that school savings banks enable a considerable amount of the children's money to survive the onslaught of the Holiday Season.

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The Los Angeles (California) High School Research Bulletin from which extracts have been made in previous numbers of the Journal continues to carry a large amount of very important material. The issue of March 13th consists of four parts and deals with special articles on subjects of the High School Curriculum by Dr. Franklin Bobbitt. The articles are written as a basis for further work by the Course of Study Committees, and deal with Physical Development and Maintenance, English Experience, Practical Arts for Boys, and Mathematics. In each, specific objectives are set up and principles involved are given consideration. Those who are vitally interested in these problems of the secondary schools and who are willing to use such material should endeavor to secure these bulletins from Los Angeles. We are quite sure that both Dr. Bobbitt and the school people of Los Angeles with whom he is working at present will be glad to have the bulletin used in other school systems.

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The Educational Bulletin of the State Department of New Jersey, January, 1922, contains a splendid article on Community Civics and Science by Miss Amelia O. Kays, teacher in the Newton High School.

The major divisions of the outline of materials are (1) The Smaller Community, as the home or the school; (2) The Larger Community—town, city, county, state, federal government; (3) Government as a means to secure co-operation.

Heat, light, water supply, disposal of waste, home conveniences, and recreation are treated under the first head; Public Welfare, transportation and communication, chemistry, come under the second; and the Needs of Government and the industrial and economic problems of government are given consideration in section three.

The outline would be of interest to teachers who have anything to do with the teaching of community civics or science in junior or senior high schools.

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The Bureau of Educational Service, Extension Division, State University of Iowa, has just issued its annual report on "Status of Teachers Salaries in Iowa" for the current year. The report is the work of Dr. H. A. Greene, Director of the Bureau, and his Assistant Mr. Don C. Rogers. Data were secured in regard to grade teachers from 812 systems in the state involving over 6,500 positions, and in regard to superintendents, high-school principals and high-school teachers from 720 school systems involving over 4,500 positions. The status of salaries is shown in terms of medians and quartiles for the various grades and positions in different-sized cities. Cities were classified into eight groups on the basis of size. Medians show that in all classes of

cities with the exception of towns of less than 500 population, the salary of grade teachers was greater in 1921-22 than in previous years.

The median salaries of superintendents showed increases for men except in cities of 5,000 to 10,000 population. High-school principals increased their salaries with but two exceptions—namely, in places of less than 1,000 population and in the case of men in places of 2,000 to 5,000 population. Women high-school teachers showed increases in cities of every size. Men high-school teachers, however, increased their salaries only in cities of 2,000 to 5,000 and in cities of over 10,000.

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The Lewiston (Idaho) State Normal School Bulletin for January, 1922, is devoted to the Testing and Teaching of Silent Reading, by C. L. Harlan, Head of the Department of Tests and Measurements and his Assistant, I. N. Madsen.

The Bulletin reports results from the Monroe Silent Reading Test in the schools of Idaho during the school year of 1920-21. Over 7,000 children were involved. Distributions and central tendencies are presented in clear detail, and graphs are given to show the relative standing of class A cities, small cities, and rural schools. Three of the conclusions are as follows: On the basis of the central tendencies of all children in each type of schools, the ranks on both speed and comprehension are the same. Schools in Class A cities score best, small city schools next, and rural schools poorest. Intelligence is shown to be a potent factor in the achievement in silent reading. Pupils in any given grade who have spent the fewest years in school have the best scores in both speed and comprehension.

One section of the report is given to suggestions for improvement in silent reading attainments. These suggestions cover recommendations as to how to increase speed or to increase comprehension. The following suggestions are given for meeting the individual needs of pupils: (1) grouping of pupils, (2) personal attention to individuals, (3) gradation of materials used in practice, (4) variation in the amount of reading practice, (5) adaptation to and development of motives, incentives, and interests of individuals, and (6) specific phases of instruction.

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Some of our readers may not be acquainted with the Research University of Washington, D. C., which was founded and incorporated under the laws of the District of Columbia for the purpose of providing federal employees and other men and women with an opportunity of gaining such college training as is necessary for efficiency and happiness. Most of the work is taught after five o'clock in the evening when day workers may take advantage of it, although day classes are also provided in a number of subjects. About 200 correspondence courses are offered for those out of the District. The institution has grown from one instructor, a handful of students, and one room in the fall of 1919 to a faculty of 75, a student body numbering nearly 1,000, and two large buildings. The president of the institution is Dr. Louis W. Rapeer.

The University is operated on a cooperative basis. The tuition is kept as low as is consistent with the policy of avoiding begging either from indi-

viduals or from the government, and the institution shares the income with the teachers on a 50-50 plan.

The institution is doing college and university work, requiring the standard 15 units for entrance and 120 hours for graduation, and conferring regular degrees upon graduates. It is the only institution of higher learning in the Capital which grants the degree of Bachelor of Secretarial Science. For the degree of Bachelor of Commercial Science, three years of successful business experience are required in addition to the regular college work.

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Cuyahoga County is one of the few counties in the country which has a full-time Assistant Superintendent in charge of Educational Research work. Bulletin No. I from the County Bureau contains 42 pages of mimeographed material dealing with tests given to about 6,600 children in 31 different districts of the county. The tests used were the Illinois General Intelligence Scale, Burgess' Silent Reading Scale, Monroe's General Survey Scale in Arithmetic, Charter's Diagnostic Language Tests, and for Spelling 25 words for each grade from the Buckingham Extension of the Ayres' Spelling Scale. The tests are being given twice the first year, and the following year the teachers are expected to give these or similar tests three times.

The Bulletin contains an introduction dealing with the value of measurement. The report on the results of the tests is written in an exceedingly clear and simple manner. However, the report does not stop at that. It gives definite suggestions for improvement. The various districts are finally ranked on the basis of an educational index number. This index number was found by adding one-third of the achievement quotient in reading plus one-fourth of each of the achievement quotients in arithmetic and language, plus one-sixth of the achievement quotient in spelling. This relative weighting of the different subjects was on the basis of the judgment of the local superintendents who were asked to rate the importance of these subjects.

Superintendent Yawberg reports that the school boards and the public generally in the various districts have shown great interest in the measuring and ranking and that one member of the board of the district ranking lowest said: "We may be lowest in this first measurement, but if we are lowest in the next, we will find out the reason why." That spirit is prophetic of activity in the right direction.

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Superintendent Herman Dressel, Kearny, New Jersey, reports the following interesting experiment which is now being conducted in his schools. We shall certainly look forward with interest to the later report on the outcome of the experiment.

"Pupils know too little of the teacher's plans. We have trained them into a ready acceptance of whatever we may dole out to them and they have, in a submissive spirit accepted their lot and their daily portion of work to be done. If the course of study were in the hands of the pupil as well as in the mind of the teacher, he would have a little clearer idea of where he is going, and whether he is on his way. With that idea in mind, several of the Principals began to plan for a series of lessons. These were intended to give

the pupil certain information and certain directions, and to place before him definite tasks to be done. In the subject of arithmetic these tasks would be graded examples. On each page he finds 'The Way To Do It.' This consists of a typical example worked out and explained. The pupil then tries his hand at working the examples given. On the sheet are directions to look for others in textbooks. The sheets we have called Job Sheets, because we are bunching them into pads of eight and ten; and when the pupil finishes a set he gives this to his teacher who places it with his other work as a finished job. When he has completed his entire set of jobs, he will be given others. In this way he is working ahead of his class, if he is a bright pupil, and trying to catch up, if he is backward. We are at present working out the job sheets in English and arithmetic. We feel confident that the job sheets will prove a time saver and will also demonstrate to teachers that pupils can do a great deal more work than we have imagined them capable of doing. For instance, a principal and I both decided that a certain number of jobs which we had ready would require two weeks for the pupils to finish. Without any discussion as to time and with the simple suggestion that this work might be done whenever they had any extra time after preparing their regular lessons, the pupils who accepted the sheets finished the entire set in two days! Since then my office force has tried in vain to keep up with the demand that the pupils are making for the job sheets."

**National Council for the Social Studies** completed its organization in Chicago on February 25th. Its purpose is to lay the foundations for training democratic citizens; and its sponsors believe that such training can result only

from a carefully developed and adequately supported system of teaching in the elementary and secondary schools. Its plan looks to promoting cooperation among those who are responsible for such training, including at least the university departments which contribute knowledge of facts and principles to civic education; and the leading groups of educational leaders, such as principals, superintendents, and professors of education, who develop the methods of handling these facts.

An advisory board was set up composed of representatives of (1) the five associations of scholars most nearly related to the purpose of the National Council,—historians, economists, political scientists, sociologists, and geographers; (2) the national organizations of educational investigators and administrators—elementary and high school principals, teachers of education, normal school principals, and superintendents; and (3) regional associations of teachers of history and civics. The function of this advisory board is to bring into the National Council the points of view of the organizations represented by its members and to insure a development of the social studies which will be in harmony with the best educational thought as well as based on the best present practice.

The following officers were elected for the year 1922-1923: L. C. Marshall, Professor of Economics in the University of Chicago, President; Henry Johnson, Professor of History in Teachers College, Vice-President; Edgar Dawson,

Professor of Government in Hunter College, Secretary-Treasurer; E. U. Rugg, Lincoln School, New York, Assistant Secretary. An executive committee, charged with the general direction of the policies of the association will consist of the officers and the following elected members: C. A. Coulomb, District Superintendent, Philadelphia; W. H. Hathaway, Riverside High School, Milwaukee; Bessie L. Pierce, Iowa University High School.

The first task the National Council is undertaking is the preparation of a Finding List of those experiments or undertakings in the teaching of the social studies which now give promise of being useful. This list will contain such exposition of the character and aims of these experiments as to make it possible for those working along parallel lines to discover each other and to cooperate more fully than would otherwise be probable. This expository material will have another purpose,—that of indicating outstanding differences of opinion and program in order that these differences may be systematically stated for purposes of analysis and discussion.

To aid in the discovery and assessment of these experiments, the National Council has in preparation a list of *Key Men and Women* who will be appointed in the various states to represent the National Council in its efforts to collect useful information and then to give currency to it. While this organization seems to represent all the elements out of which the best development of the social studies must proceed, the most useful work will be done only with the cooperation of teachers and investigators in all parts of the country to the end that lost motion and needless repetition may be eliminated and that mutually strengthening experiments may be pressed forward.

Persons who are interested in the wholesome development of the social studies, whether teachers or others, and if teachers, whether teachers of the social subjects or of some other subject, are urged to communicate at the earliest convenient moment with the secretary of the National Council, Edgar Dawson, 671 Park Avenue, New York City.

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**Ohio State Educational Conference** The second annual meeting of the Ohio State Educational Conference was held at Ohio State University March 23-25, 1922. The program consisted of three general sessions and twenty sectional sessions. The general theme of the Conference was Supervision, with special emphasis upon the place of the Building Principal in the supervisory program. The keynote of the Conference itself was expressed by Dean George F. Arps of the College of Education, who as presiding officer at the first session, expressed the hope that the Conference would be a *working conference*. This hope was transformed into a reality, for every paper presented workable material and the response from the floor whenever discussion was permissible showed that the audience was quite willing to contribute to the success of the program.

Among the speakers who addressed the general sessions were: President W. O. Thompson, Dean George F. Arps, Dr. B. R. Buckingham, Dr. Boyd H. Bode, all of Ohio State University; Superintendent R. G. Jones of Cleveland and Superintendent R. J. Condon of Cincinnati; A. C. Perry, Jr., District Super-

intendent, and Angelo Patri, Principal P. S. 45, New York City; and Dr. W. W. Charters, Carnegie Institute of Technology.

The sectional meetings which occurred on Friday included the following: Administrative and Supervisory Research, High School Principals, Elementary Principals, Teacher-Training, American History, Art, Biological Science, Non-Biological Science, English, Latin, Mathematics, Modern Languages, Home Economics, Industrial Arts, Music, Vocational Agriculture, Physical Education, Clinical Psychology, Educational and Psychological Tests, and a demonstration of Educational Tests.

It had been hoped by those in charge that the program would appeal to all classes and grades of educational workers in the State. The attendance of over 2,500 persons representing practically every phase of educational work would seem to justify the belief that this purpose was realized. A number of cities dismissed school in order that all teachers might be present for the Friday and Saturday sessions. Others made special provisions for the release of the administrative and supervisory forces.

The exhibits held during the Conference attracted a great deal of attention. Professor A. E. Waller of the Department of Botany and Professor D. M. DeLong of the Department of Zoology and Entomology prepared an exhibit of biological material which indicated ways of improving teaching and increasing interest in the biological sciences. The Department of Physical Education of the University displayed what was, as far as can be learned, the first physical education exhibit to include all phases of such work from the elementary school through the university. The Department of Psychology had an extensive exhibit of educational and mental tests. An exhibit of some two thousand textbooks and educational pamphlets was prepared by the Bureau of Educational Research. The large numbers attending these exhibits and the great interest evinced by all visitors was satisfactory evidence that a distinct service was rendered in this manner.

#### The Validity of Timed-Sentence and Column Tests in Spelling

A few years ago a number of workers in educational research, notably Courtis, Fordyce, and Monroe, called attention to the fact that "the percent of correct spellings is higher when the words are dictated separately than when the words are dictated in timed sentences and the pupils forced to write at their normal rate."<sup>1</sup> The subsequent production of "Timed-sentence Spelling Tests" has greatly affected the practice of surveyors, superintendents, and teachers desiring to measure the spelling ability of groups of pupils. The prevalent opinion seems to be that "by using the words embedded in sentences and dictated rapidly enough to force the child to write at his normal rate, we measure the spelling ability which functions in one's every-day writing."<sup>2</sup> The Monroe tests and similar tests constructed by teachers and superintendents have been very extensively used. I have before me five mimeographed bulletins reporting the results of this year's (1920-21) testing in as many Ohio cities. All employed timed-sentence tests for measurements in spelling.

<sup>1</sup> Monroe, Walter S., *Measuring the Results of Teaching*. Boston: Houghton Mifflin Company, 1918. p. 182.

<sup>2</sup> *Ibid.* p. 183.

The complaint, however, is frequently heard that timed-sentence spelling tests are difficult to score and the resulting scores less accurate than those obtained from tests of the conventional column type. Investigation has shown that nearly twice as much time is required to score timed-sentence test papers as is necessary for a column test containing the same number of test words. Perhaps, therefore, it is in order to inquire as to the relative validity of these two kinds of tests. Granting that pupils do not do as well on timed-sentence as on column tests, may it not be true that there is a high degree of consistency between the results of the two? If, in short, there is a high correlation between the results of two tests, one timed-sentence and the other column, it is fair to question the wisdom of expending the time and energy involved in preparing and administering timed-sentence tests and scoring the papers.

However high the correlation it cannot be adequately interpreted without some basis for comparison. Accordingly one timed-sentence and two column tests were prepared in order that the correlation between the scores of the two column tests might be compared with that between either of the column tests and the timed-sentence test.

Letters were addressed to five Ohio city superintendents\* who were known to be interested in the problems of educational research. All very cordially agreed to give the tests to sixth-grade pupils and to supervise the scoring of papers and recording of scores. The tests are given below.

#### SPELLING TESTS FOR SIXTH-GRADE PUPILS

##### INSTRUCTIONS

The three tests should be given in succession to a group of pupils. All sixth-grade classes in the system should be tested on the same day, if possible, or, if this is impossible, on two successive days. The days are Thursday, December 2, and Friday, December 3, 1920.

##### TEST A

Say to the pupils, "I have here a list of words which I want you to spell. You will need a large sheet of paper and a pencil or pen. Better have an extra pencil within reach, so that if you break one you will not be delayed." Pause until all are ready. Then say, "Write your name at the top of the sheet. Number your words down the left hand side 1 to 25. (Pause) I shall pronounce each word twice. I shall not use the words in sentences nor tell you what they mean, so do not ask questions. Take time to dot your i's and cross your t's. All ready!"

The list follows:

1. lose	6. decide	11. invitation	16. opinion	21. total
2. machine	7. wreck	12. accident	17. celebration	22. supply
3. improvement	8. busy	13. success	18. minute	23. accept
4. assist	9. particular	14. different	19. forenoon	24. official
5. organize	10. therefore	15. believe	20. avenue	25. complete

\*Grateful acknowledgment is made to Supt. J. V. Nelson, Bellaire; Supt. J. R. Patterson, Bucyrus; Supt. F. J. Front, Chillicothe; Supt. E. L. Daley, Circleville; Supt. R. C. Maston, Martins Ferry; and Mrs. Margaret Brainard, Director of Educational Research, Martins Ferry.

I. Q. indicates the brightness of a class, but tells nothing of how high or how low it stands in respect to mental development. A first-grade class and an eighth-grade class may both have an average I. Q. of 110 which places them on a par so far as brightness is concerned. The difference in intelligence, however, would be about seven years of mental age. This difference is the significant one for purposes of supervision.

In Saint Paul we have just concluded the examination of thirty-two VIII-A classes. In each case we have calculated the median mental age and the median I. Q. If one arranges these classes according to mental age, the order will be very different from that of the classes ranked according to I. Q. For example, the class occupying the second position from the top drops to the seventeenth place. Other classes rise or fall a number of positions. This is, of course, due to the varying chronological ages of the pupils who make up the several classes. To rate according to the I. Q. is to assume that the average ages of classes are the same, but this assumption is not true and the conclusions drawn from it are not valid. (The table given below shows the displacements in rank which take place when classes are rated according to median I. Q. instead of median mental age. It should be remembered that the maximum possible displacement in rank among 32 classes would be 31 positions. )

Displacements in rank	Number of Classes
0	1
.5	1
1	1
1.5	4
2	5
2.5	3
3	1
3.5	1
4	1
4.5	2
5	2
5.5	1
6.5	2
7	1
8	2
10	1
11	1
14.5	1
Average	4.2

The above table shows that only one class out of 32 retained the same rank. Several classes suffer severe changes, while the average of the displacements is 4.2 positions. This shows clearly that these two methods of evaluation of mental ability will yield widely different results and that as a consequence workers in mental measurements should be careful which one they use if they would secure reliable data.

O. J. JOHNSON  
Ass't Director Research

St. Paul Public Schools

## Grading by Means of Standardized Tests

Mr. L. C. Wilkerson, Principal of the Opportunity Farm School, Cincinnati, Ohio, has sent us a brief statement of his efforts at the proper grading of 75 boys, all delinquents. No school records accompany the boys and their attendance is limited to one-half of each school day. The psychology tests given by the Vocational Bureau showed only four boys with an I. Q. of one hundred or better. Standard educational tests were given in reading, vocabulary, spelling, composition, arithmetic, geography, and history. The records of each individual were graphed in terms of standard grade achievements, as illustrated in the accompanying figure.

## INDIVIDUAL GRAPH RECORD

Name, J. W. Born, Sept. 5, 1906 Grade V  
 Mental Retardation or Acceleration, 1 yr. 9 mo. I. Q., 88

Test	Grade					
	3	4	5	6	7	8
Monroe Reading, Rate.....					*	
Monroe Reading, Composition.....			*			
Courtis Reading, Rate.....	*					
Courtis Reading, Questions.....			*			
Courtis Reading, Index.....			*			
Gray, Oral Reading.....			*			
Thorndike, Vocabulary.....		*				
Spelling, List.....	*					
Spelling, Timed Sentence.....	*				*	
Geography.....						
Composition, Story.....	*					
Composition, Form.....	*	*				
Arithmetic.....	*					

As a result of these tests, reclassification was made. Out of each ten, one could be advanced one grade, four were properly placed, four belonged one grade lower, and one two grades lower.

As the result of this reclassification, a new school spirit was created. Each boy's graph showed where he needed help and each teacher taught in terms of the need. The boys were anxious to take tests and record the progress they were making in their various studies. After a year's trial it was found that "specific treatments for specific educational ailments produced some striking results." Tests in silent reading at the end of the year showed each grade, with few exceptions, at or above standard. All boys at the end of the year were promoted except two who had received promotion at mid-year. Considering the fact that school work occupied but one-half of each day, the results were most gratifying.

## Educational Research Association

(FRANK N. FREEMAN, *Secretary and Editor*)

It has been the custom to print in this section personal notices concerning members of the Association, and brief accounts of the problems, on which they are working or of the results of investigations which are not extensive enough to justify writing articles upon them. On the account of the election of a new secretary at the last meeting, the members of the Association have not yet acquired the habit of sending him material. This is a renewal of the standing invitation to send appropriate notices, or literature regarding important meetings, conferences, etc., or concerning scientific investigations which are in progress or completed. Let each member send the kind of information about himself that he would like to have about his fellow members. Address the secretary at the University of Chicago.

The secretary proposes to throw the section open to another type of communication. It seems to him that it would be profitable to make it a forum for brief discussions of problems connected with scientific investigations. The problems might be concerned with the technique of investigation or with the interpretation of its results. They might be general in their reference or they might refer to some particular published study. They should in all cases be brief, pointed and specific. Administrative problems arising out of the conduct of research or of the scientific survey of school systems might be treated. Requests for information on proposed investigations would also be appropriate. The suggestion is that the Journal be used as the medium for a continuous round-table discussion of our professional problems.

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Leon O. Smith, Assistant Superintendent of Schools of Omaha, will give a course in Public School Publicity and one on The Elementary School Curriculum at the University of Montana during the second term of the coming summer session. Mr. Smith has recently been elected President of the Nebraska Conference of Social Workers.

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A conference of the Bureau of Educational Reference and Research of the University of Michigan was recently held under the direction of Dr. Clifford Woody. The program was contributed to by administrators and teachers from various parts of the state and consisted chiefly of reports of the use of mental or educational tests. Some of the papers will be published in this journal. The meeting was well attended and much interest was manifested in the display

of educational and intelligence tests and in the exhibit of numerous graphic and tabular methods of presenting the results of tests.

A report has been received of the results of a series of United States history tests in Boston. Both the tests and the investigation were organized by Miss Olivia C. Penell, Research Assistant in the Department of Educational Investigation and Measurement. A test is designed for each of Grades VI, VII, and VIII. Some of the tests are common to three and some others to two of the grades. The questions are largely of the type which test information.

TABLE I—COMPARATIVE RESULTS ON QUESTIONS COMMON  
TO GRADES VIII, VII, VI

GRADE	Question	VIII		VII		VI	
		Possible Credit	Median Credit	Percent of Accuracy	Median Credit	Percent of Accuracy	Median Credit
I. PERIOD OF DISCOVERY AND EXPLORATION.....		10	9.1	82.0	9.04	80.3	8.95
II. PERIOD OF SETTLEMENT:							
1. ASSOCIATE COLONY WITH NATION AND DATE.....		10	5.6	51.3	5.6	51.3	6.9
2. ASSOCIATE MAN WITH COLONY.....		5	3.2	55.4	3.1	52.2	4.2
3. CAUSES OF SETTLEMENT.....		2	1.3	41.1	1.3	38.4	1.5
PATRIOTIC DATES...		10	6.9	59.7	6.7	58.8	6.1
							54.3

TABLE II—COMPARATIVE RESULTS ON QUESTIONS COMMON  
TO GRADES VIII AND VII

GRADE	Questions	VIII		VII	
		Possible Credits	Median Credits	Percent of Accuracy	Median Credits
III. PRE-REVOLUTIONARY AND REVOLUTIONARY PERIOD.....		10	5.7	50.8	6.1
INVENTORS AND INVENTIONS.....		10	6.02	55.2	3.95
LATE EVENTS.....		3	1.96	48.5	1.1
					30.8

Some require the underlining of one out of several items, some for supplying words, some for the completion of sentences. The information called for consists of dates, names of persons and places connected with important events, facts concerning political, social, and industrial movements, etc. The tests were given to over 900 pupils of each of the three grades. Tables I and II show the comparative scores for the different grades.

Among the conclusions were the following. Many of the historical facts which are taught in the sixth grade are remembered during the two remaining grades. (Nothing is said in this connection concerning the possible effect of elimination.) Fact questions obtained a higher percent of accuracy than judgment questions.

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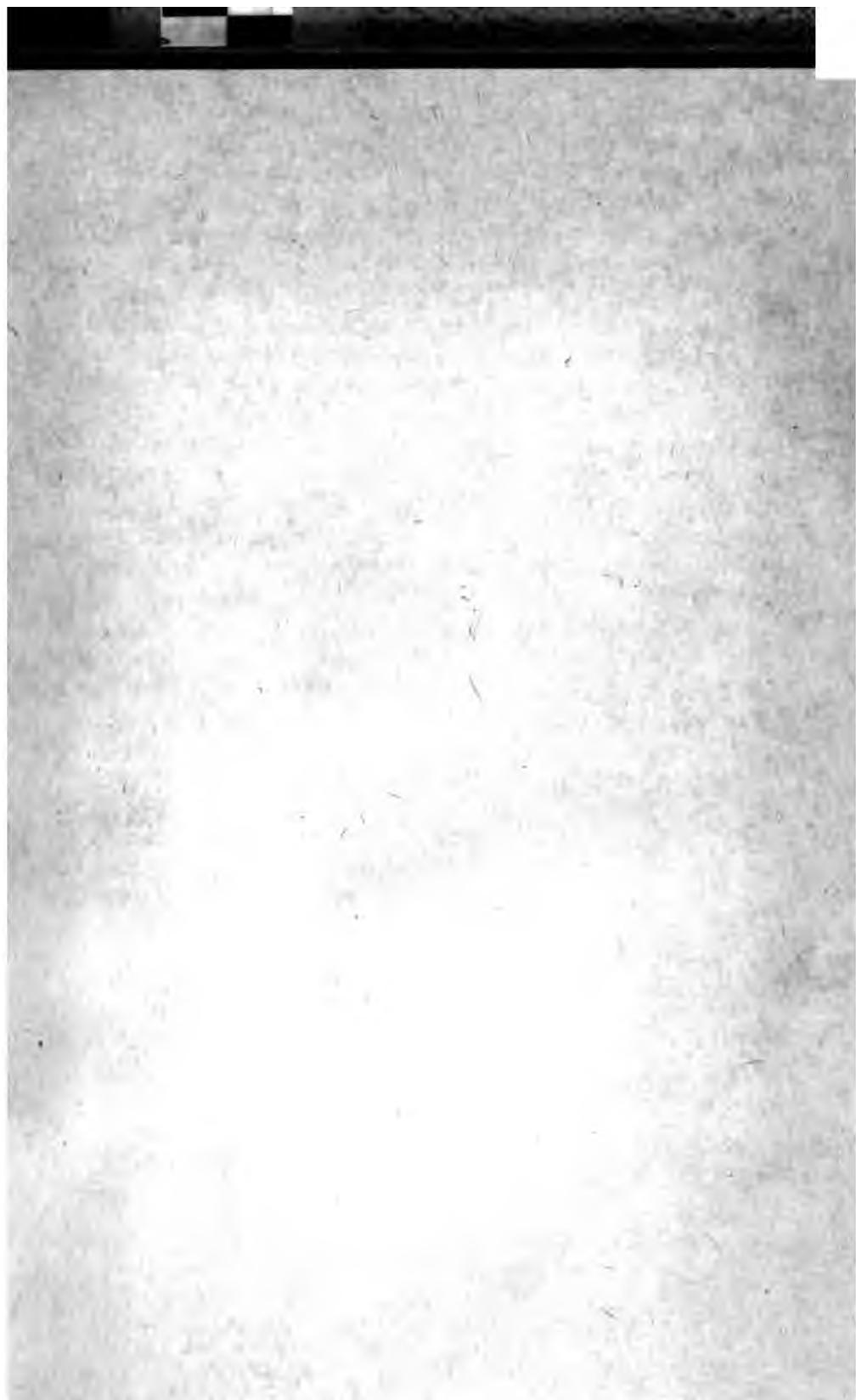
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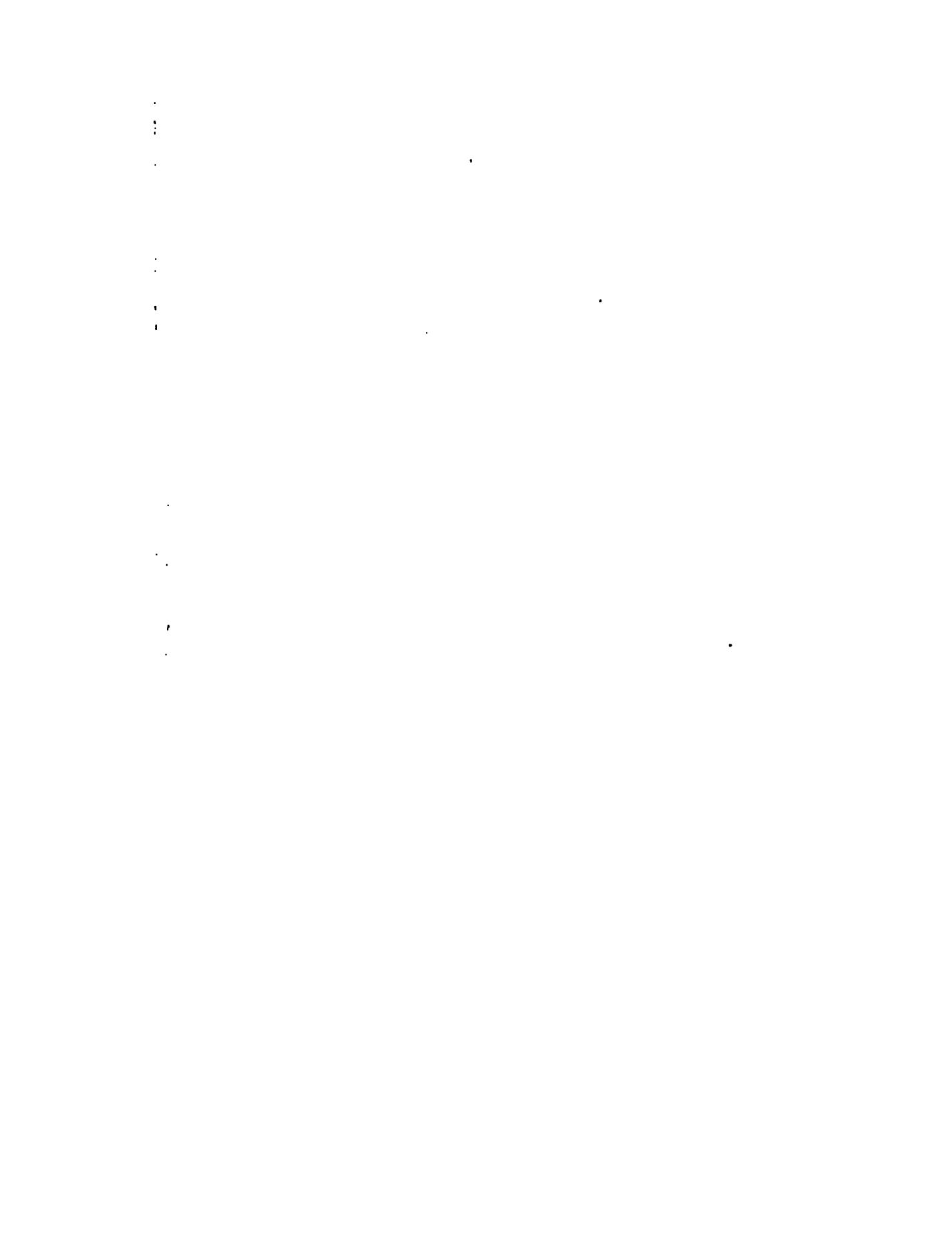
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